AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION

VOLUME 24 — NEW YORK AND LONDON — NUMBER 37

Published at 218 William St., New York,
Every Thursday by the

American Machinist Press.

[INCORPORATED.]

Also published at 34 Norfolk St., Strand, London, W. C.,
Every Saturday.

Correspondence on mechanical subjects solicited. Name and address must always be given—not necessarily for publication.

Address all business communications to the American Machinist Press. Matter for reading columns may be addressed to the Editor.

Subscribers can have address changed at will. Give old and new addresses. Date on wrapper denotes end of month in which subscription expires.

Subscription Price:

$4 per year, postage prepaid, to any post office in the world. No back numbers beyond current year.
For sale by newsdealers, generally.

Subscription agent for Denmark, Norway and Sweden, V. Lowener, Copenhagen. Subscription agent for Germany, Austria and Holland, Gustav Diechmann & Sohn, Neue Promenade 4, Berlin. Subscription agent for Spain, J. F. Villalta, Puertaferrisa, 7-9 Barcelona.

Entered at New York P. O. as mail matter of the second class.

Cable address, "MACHINIST," N. Y.
Lieber's and A B C Codes.

No good citizen can fail to be profoundly shocked and outraged by the attempt made upon the President's life in Buffalo, and all will join in the earnest hope that he will speedily recover. According to the reports, the first three sentences he spoke after being shot show very clearly his inherent nobility of character. The first showed his concern for his invalid wife, the second for the misguided and murderous wretch who had shot him, and the third for the disturbance the tragedy might make to the exposition and its success. A man of less exalted character would have thought of himself and his sufferings under such circumstances. The President's temperate habits and clean living will do much to help his recovery and it is to be hoped that this will be speedy and complete. The only regrettable thing about that would be that the punishment that could then be given to the assassin would be limited by law to an entirely inadequate term of imprisonment. It is difficult to see wherein a man who does his best to kill another and fails only by accident is any less a murderer than though he were successful, or that it is any safer for him to be at large.

Liquid Air.

Some interesting revelations are appearing in the daily papers concerning the Tripler Liquid Air Company, and the ways and doings of the professional promoter become prominent. The Tripler company, it appears, was organized under the laws of Arizona with a capital of $10,000,000 in 1,000,000 shares. The company has no income, is manufacturing nothing and of course there are no dividends, past, present or prospective. The industry of the company has consisted almost entirely in the sale and manipulation of its stock. As to the distribution of the stock there seem to be conflicting statements. Mr. Tripler is understood to have received $2,500,000 of it for his patents and $1,000 per month for his services; $4,000,000 in shares are said to have been divided among the directors, prominent of whom are United States Senator John P. Jones of Nevada and former senator Stephen W. Dorsey, who was involved in the Star Route scandals. A contract was made with Gerald M. Fennell & Co. by which they were to sell the stock on a big commission. They filled the country with advertisements and stock was extensively sold, realizing, it is said, some $250,000, of which nothing is now left. The money has stopped coming in and trouble has been brewing. The revelations have been precipitated by the anxieties of an individual purchaser of a couple of hundred shares, who does not know and wants to find out whether he has bought treasury stock or from the private property of one of the directors. It probably really makes no difference. There is something lacking in the education of the masses, or they would not be so easily duped by such pretentious schemes as these. We are quite confident that readers of the "American Machinist" are not among the liquid-air victims.

Reciprocity.

To judge from what President McKinley in his speech delivered on the 5th inst. at Buffalo said about reciprocity and the necessity for the exchange of goods between this country and others, he has heard of the doings of the Manufacturers' Convention at Detroit and clearly perceives that the drift of things is in that direction. He is reported as saying:

"A system which provides a mutual exchange of commodities is manifestly essential to the continued and healthful growth of our export trade. We must not repose in fancied security that we can forever sell everything and buy little or nothing. If such a thing were possible, it would not be best for us or for those with whom we deal. The period of exclusiveness is past. The expansion of our trade and commerce is the pressing problem. Commercial wars are unprofitable. A policy of good will and friendly trade relations will prevent reprisals. Reciprocity treaties are in harmony with the spirit of the times; measures of retaliation are not."

It is but a short time since the utterance of any such sentiments by any member of the Republican party would have been the rankest heresy, and their utterance now by the man who, more than any other, has stood for high and higher protection shows as clearly perhaps as any other single incident the very great change of sentiment that has been brought about by the activities of American manufacturers in foreign markets.

Again the President says:

"If, perchance, some of our tariffs are no longer needed, for revenue or to encourage and protect our industries at home, why should they not be employed to extend and promote our markets abroad?"

The words "if, perchance," can scarcely fail to provoke a smile by those who attended the Detroit convention and heard one after the other of the representative manufacturers of the country, engaged in all sorts of industry and most of them avowed members of the President's party, declare that, for their industries, protective tariffs were no longer needed and that they would be better off without them.

And that the National Association of Manufacturers is moving in the matter of reciprocity is shown by the fact that the executive committee of that organization at a meeting held in Philadelphia on the 4th inst. arranged for a reciprocity meeting, the time and place of which are not yet decided but which will probably be held as soon as it can be arranged for. That meeting will probably call out all the forces for and against the principle of reciprocity, or, in other words, for the recognition of the fact that if you have goods that you want to sell to a man you must not tell him that you will take no goods from him in exchange for them, or that, while it is a good thing for him to buy goods from a foreigner, it would be ruinous for you to do the same thing. It remains to be seen whether or not the representatives of the knit-goods interests will attend the meeting to bluff the other members, as their representative did at Detroit, or whether they will prefer to avoid showing their hand there and depend upon lobbying at Washington to defeat reciprocity

treaties, as the convention was plainly told at Detroit had been done before and that that was the reason the treaties had not been ratified. As we have said before, it will have to be recognized that the interests of the majority must prevail, and if the majority is to be frightened out of taking action known to be in its proper interests because one industry attempts to block the way, nothing will ever be accomplished.

Mobs and Injunctions.

A judge of a Southern superior court utters a warning regarding the prevalence of violence in the South and calls attention to the fact that if good men can lynch bad ones when they have the power to do so, then bad men may lynch good ones when the power is secured by the bad. This is undoubtedly a wholesome thing to think about and the same principle applies also to labor disputes and the troubles that grow out of them. We therefore particularly regret to see newspapers which have had so much to say about the necessity for maintaining law and order when strikers have been charged with disorder, turning around to commend the action of the mob of Tampa, Florida, which was said to be composed of leading citizens and which kidnapped and removed to an unknown place the leaders of a cigar makers' strike that took place there. In this case it was said that the law would not reach these men, as they were violating no law, but that they were stirring up trouble and something had to be done. But the American citizen who has not learned that it is not right to deprive other people of their liberty without due process of law and who acts upon his ignorance of that fundamental principle ought himself to be locked up until he learns it and is ready to abide by it. Of course law and order must be maintained at any cost, but an unlawful mob is not made lawful nor its acts justified by the fact that the men composing it are the so-called leading citizens and are able to live and to dress well. On the contrary, such men have less excuse for breaking the law in the interest of what they suppose to be their rights than have those who are not able to live or to dress so well and are perhaps struggling for the elementary necessities of life.

Workingmen are gradually being taught the necessity for the maintenance of law and order, and it is right that those in need of the lesson should have it; but this should apply to those who are not workingmen as well, and if it does not generally so apply there will almost certainly be trouble over it which no amount of enjoining by the courts will prevent.

And speaking of injunctions it seems quite certain that some of the judges have gone entirely too far with them. Below we quote from an editorial article in the "The Evening Post," of New York, a paper which, perhaps less than any other in America, can be said to be on the side of workingmen in labor disputes. The "Post" says:

"We have had rather too much of injunctions of late, and these have been directed against workingmen in a slipshod and undiscriminating way. Yet we have seen nothing in the proceedings of labor unions or of labor leaders to betoken that they take much interest in the subject. They ought to have held mass meetings to protest against the numerous injunctions that have been issued of late against picketing. These are infringements on liberty. We stand with the Supreme Court on the subject of injunctions against arson, murder, riot, and the stoppage of mail trains or any trains that are proceeding in a lawful way, but an injunction against peaceable persuasion, against talk on the street, unaccompanied by the use of force or violence, is making that criminal which the Constitution of the United States makes lawful and protects in the most solemn manner."

It is very significant when a paper of the character of the "Post" utters sentiments like these, and though perhaps workingmen who have been deprived of their Constitution-guaranteed rights by some of these injunctions are not yet fully alive to the enormity of them, there is little doubt but that they will be and that the power of judges to issue and to enforce such injunctions will be taken away from them. If that were all the harm done by them it would perhaps not be so very great but such usurpations of power by the courts are sure to lessen respect for them and for their decisions, not only among workingmen, but among all classes of intelligent and fair-minded people; and the harm that may come from that no one can estimate. History is full of accounts of the fighting that men have done to establish the right of free speech. It is a right that has cost humanity rivers of blood and it can never be infringed upon with safety to society nor even to the permanent advantage of those who think they gain and who in fact may gain a temporary advantage by such infringement.

The Average American.

Dr. Henry Gannett, the geographer of the twelfth census, in a recent magazine article undertakes to give some idea of what the average American is like. We suppose this average American is an imaginary personage made up from figures as to the total possessions of all kinds in the country, divided by the number of men in it. On this basis the average American is shown to be very comfortably fixed. He is 37 years old, expects to live to be 67, lives in a house two stories high with seven rooms, surrounded by 137 acres of land, 80 of which are in a state of cultivation; the farm is worth $3,500, besides which the man has $750 in railway stocks and bonds and $150 in the bank, his annual income being about $750. It would seem that this composite American is decidedly economical to be so well off on the salary named. His table expenses are $16.00 a month and he travels about 1,000 miles each year at a cost of about $20. All this is interesting in the abstract, but we notice that some of our contemporaries are drawing rather queer conclusions from the article. These conclusions are completely upset when one stops to think that if one man owned all the land, had all the houses, owned all the farms and had all the money, the average American would still be fixed exactly as he is now. In other words, distribution does not affect average figures.

Legal Notes.

BY WM. MARSTON SEABURY, LL.B.

RECOVERY FOR PERSONAL INJURY FROM BREACH OF WARRANTY—LIABILITY OF MANUFACTURERS NOT PARTIES TO THE CONTRACT.

Ernest Tyler bought from Hall & Son an acetylene gas generator which, it was guaranteed, was entirely safe, perfectly automatic in its action and could not generate gas beyond its capacity if it were properly taken care of.

An explosion of the gas generated occurred and caused Tyler injuries, to recover damages for which he brought suit against Hall & Son and made the manufacturers of the machine parties to the action. At the conclusion of the plaintiff's evidence the trial court directed a verdict for the defendant, and the plaintiff appealed from the decision to the Court of Appeals of Kentucky.

In reversing the judgment of the trial court the Court of Appeals, in quoting from another case, said: "Where an act of negligence is imminently dangerous to the lives of others, the guilty party is liable to the one injured thereby whether a contract between them be violated by that negligence or not."

In continuing the discussion the court said: "The exact criterion of recovery in this case, even if appellant (the plaintiff) should be liable, on the proof, to recover at all, was not passed on by the court below, unless the court intended by his direction of a verdict to hold that damages for personal injury could not be recovered and that there was no claim of difference in value of the machine and no recovery sought therefor. The warranty as alleged and proved by appellant's evidence was against explosion—the very thing shown to have happened. Upon this showing by appellant, uncontradicted, we think he would be entitled to recover for his personal injury, as this evidently was in contemplation of the parties or according to the natural or usual course of things, might result from a breach of the warranty that the machine would not explode." (6 S. W. R. 433.)

The Allis Engines at Glasgow.

It seems likely that the Allis engines installed at Glasgow are to receive a great deal of valuable and gratuitous advertising which they would not otherwise have received had it not been for the eagerness of certain British editors and others to criticise and condemn them. They declared unanimously and vociferously that the engines were poorly constructed, poorly designed and utterly unfitted for the service for which they were intended. This naturally arouses those who are responsible for the selection and installation of the engines, and they are explaining things, much to the consternation of the critics, we should imagine.

For instance, in a recent consular report sent out by our consul at Glasgow, Samuel M. Taylor, he quotes one of the managers of the road as saying: ". . . from the time they were properly started, they have given every satisfaction and continue to do so. They have come quite up to the best expectations formed of them; in fact, they have surpassed anticipations. As they have not been officially tested yet, it is perhaps premature to give any opinion regarding their real merits; but so far as their connection with the operation of the tramways is concerned, they have done splendidly."

We would quote more fully from this report were it not for the fact that we have already published the gist of what is in it; but our readers will readily see that the Allis engines are likely to have a more extended and better reputation in Europe by reason of the attacks that have been made upon them than they would otherwise have had.

England also is proposing to do something interesting in the way of rapid transit. Mr. Behr's scheme for a high-speed mono-rail line between Liverpool and Manchester has just received the sanction of Parliament, subject to the detailed plans being submitted to the Board of Trade and approved by that authority before the work of construction is commenced. The speed expected to be attained is 110 miles an hour, and the time taken in covering the 35 miles between the two cities is to be reduced, if the inventor's hopes are realized, from 45 to 20 minutes.

Commercial Review.

New York, Monday, Sept. 9.

MARKET NEWS AND OPINIONS.

The Allis-Chalmers Company has received the order for the engines of the New York subway. The Babcock & Wilcox Company has received the boiler order. The contracts for the electrical equipment have not yet been awarded.

In estimating business conditions in the mechanical lines we are inclined to attach importance to the views of one of the principal concerns in this country engaged in the manufacture of drop-forged tools and other drop forgings, whose name and location, however, we are not at liberty to mention. They reach thousands of manufacturers covering numerous departments of industry and hence are a good criterion of general trade. In this case the summer has been found unprecedently active and there is a satisfactory increase of activity as fall approaches, so there is every prospect of a good autumn season. Business, however, has been characterized by a steady movement rather than by a boom and the year is considered eminently typical of what a business year ought to be. Neither the machinists' nor the steel strike has materially interfered with demand, according to the experience of this concern. Prices they expect to continue firm this fall, and are not looking for an advance. Collections are good.

Still another British Westinghouse equipment contract is to be reported. The Watson-Stillman Company, of this city, has lately received an order for fourteen hydraulic presses to go in the Manchester plant. These are for different purposes and resemble presses that have been built for works in this country. It was understood previously that the presses for the British Westinghouse plant would be ordered in England. The company desired to get the present lot completed on two months' notice, but that condition was not finally insisted on. The Watson-Stillman Company has been building a lot of sixteen other presses for shipment to Germany, but it is making no effort for foreign trade, as it is almost overwhelmed with the domestic business that is constantly coming in.

A contract for isolated lighting generators of some note recently let in New York city is on behalf of the large new annex to the Mutual Life Building. The Bullock Electric Manufacturing Company will build these dynamos, which are three in number and of 350 kilowatts capacity each.

For a number of months government experts in the Post Office Department have been critically comparing the merits of cast iron and sheet steel letter boxes and have decided by an almost unanimous vote in favor of sheet steel boxes for future requiremnts. Orders have been accordingly placed with the Toledo Machine & Tool Company, of Toledo, Ohio, for the necessary shears, punch presses, drop hammers and dies to manufacture four sizes of steel letter boxes. The company expects to embody a number of novel mechanical ideas in the construction of the dies and presses.

Bids were opened by the bureau of supplies and accounts, Navy Department, September 3, for a considerable quantity of large machinery for plate working, etc., for the New York Navy Yard. A partial list of the lowest bidders is as follows: Brown & Sharpe Manufacturing Company three improved grindstone troughs with stones 39 inches diameter and 5-inch face, weight of stones about 500 pounds each, weight of machines without stones 650 pounds, $335.22. Prentiss Tool & Supply Company, one 1½-inch heading and forging machine to be driven from main line shaft running at 120 revolutions per minute, $1,772; one vertical milling machine, $674. George Place, 120 Broadway, New York, one 36-inch engine lathe, to be driven from a countershaft 1¾ inches diameter, $1,455; one 60-inch full universal radial drill, $872; one 37-inch boring and turning mill with two swivel heads, $1,310. Fairbanks Company, 311 Broadway, New York, one improved pipe-threading, cutting and nipple machine, $367; one radial drilling and countersinking machine, $459; one suspension drill, back-geared, constructed to fasten to the ceiling, $258; one cutting-off machine, 4-foot bed, $175; one improved pipe-threading and cutting machine with patent adjustable expanding die heads, with interchangeable chasers, cutting pipe 1 to 4 inches, $476. U. Baird Machinery Company, one 13-inch slotting machine, $1,200; one No. 3 turret head power bolt cutter, $130; one power plate horizontal bending rolls, $13,100. Niles Tool Works Company, one 2-spindle centering machine No. 2, $290; one radial drilling machine with swiveling head, $909; one plate planing machine, $2,241. Walter H. Foster, 126 Liberty street, New York, one power plate straightening rolls, $2,490. William White & Co., Moline, Ill., one combined punching and shearing machine, to have a depth of throat on both ends of 42 inches, $2,200. Henry Pels & Co., 66 Broad street, New York, one combined punching and shearing machine, to have a depth of throat at both ends of 20 inches, $900. Thresher Electric Company Dayton, Ohio, five 5 horse-power motors, two 7 horse-power motors, one 7½ horse-power motor, one 10 horse-power motor and one 20 horse-power motor, $2,847. Some of the bidders above mentioned also made bids which duplicated others as lowest figures.

Some machine tools and pumps will be included in a sale of old material at the New York Navy Yard, which will be made through sealed proposals to be opened September 28. Schedules, etc., are obtainable from the general storekeeper at the navy yard named.

The new addition to the plant of the Cincinnati Planer Company, of Cincinnati, Ohio, having been completed, they are now putting in the equipment of machine tools, which includes several planers of their own make, a 36-inch automatic gear cutter, a universal grinding machine, a horizontal boring and drilling machine, a radial drill, a large special turret machine, a milling machine, and several engine lathes.

The Triumph Electric Company, Cincinnati, Ohio, is "snowed under" with orders, and to keep up with them is com-

pelled to work its factory to the fullest limit twenty-four hours a day with two full gangs of men.

The Reeves Pulley Company, of Columbus, Ind., has in course of construction an addition to its transmission department 112x56 feet, with traveling crane, in which they will operate such heavy machinery as is used in building their larger sizes of transmission. They have four months' work in this line, even without receiving another order. They hope to have machinery running in the new building by November 1. Their variable speed transmission device has been meeting a large sale all the season. This has also been their banner six months in the pulley business. They are now finishing up a main drive pulley 16 feet diameter, 31 inches face, with weight guaranteed of 12,000 pounds, built entirely of Southern Indiana oak.

Pawling & Harnischfeger, Milwaukee, Wis., regard the business situation as very satisfactory indeed. They are running with a double crew of men, and have a larger force employed than at any previous time in their history. Among recent orders is the initial one of the Allis-Chalmers Company for its new Milwaukee works, consisting of one 75-ton, one 25-ton and three 40-ton electric traveling cranes. The Baldwin Locomotive Works Philadelphia, have ordered five 10-ton electric traveling cranes, the Lackawanna Iron & Steel Company one 10-ton and two 20-ton for their new Buffalo works; the Pittsburgh Reduction Company one 50-ton, and many other crane sales have been made. The firm has also sold a large number of one and two-motor electric hoists during the past month, and the inquiries received indicate a large volume of business for the future.

The electrical power-transmission plant of the Snoqualmie Falls Power Company is to be increased from 8,000 to 20,000 horse-power. In the present plant, by which current was first transmitted two years ago, electrical power is conveyed to Tacoma, 44 miles distant from the falls, as the crow flies, and to Seattle, 32 miles. The electrical machinery for the additions is all to be furnished by the Westinghouse Electric & Manufacturing Company. The Abner Doble Company, of San Francisco, which furnished the water-wheel equipment for the initial installation, are figuring upon placing their wheels in the new extension, and an engineer of another water-wheel concern is likewise looking into the matter. The water-wheel contract will not be let for sixty days yet. If an impact wheel is used there will be a single wheel on each end of each generator shaft and each wheel will be driven by a single jet of water 14 inches in diameter, the two jets combined being sufficient under the existing head of 270 feet to give the requisite power. The two water wheels and the generator between will be built on a single hollow shaft of oil-tempered nickel steel. The present underground generating station, which is 200 feet long is to be lengthened out 150 feet. A new penstock is to be built which will carry 50 per cent. more water than the old one. The transmission line which is to parallel the old line will require 125 tons of aluminum wire, and the order for it has already been placed. At Tacoma a large substation is now being erected. The entire cost of these improvements will be in the neighborhood of $400,000. It is expected that the first of the new generators will be delivering current into Seattle and Tacoma within the next nine months. The generating machinery will consist of three 3,000-kilowatt (about 4,000 horse-power) rotating field generators of the two-bearing type, generating a three-phase current at 1,100 volts and 7,200 alternations. The speed is to be 100 revolutions per minute. Each generator will require an exciting current of 320 amperes approximately, at 125 volts. For exciting these three generators a 200-kilowatt, eight-pole, direct-current generator of the two-bearing type is to be used. At 175 revolutions per minute it is to deliver under normal load a current of 1,600 amperes at 125 volts. The current generated at 1,100 volts is to be raised to a line potential of 30,000 volts by nine 1,000-kilowatt, oil-insulated, water-cooled transformers. It is estimated that each transformer will weigh 11,000 pounds and require 500 gallons of oil.

CHICAGO MACHINERY MARKET.

Metal workers are just now faring not quite so well in the procurement of material as many other branches of industry, this on account of the steel strike. Consequently supplies which go exclusively to machine shops have less of that activity which appeared earlier in the summer than have some other departments of industry. General business conditions are prime. Makers of general supplies, like belting, shafting, pulleys, hangers, etc., have no cause for complaint about the condition of business. They have all they can do. Many of them are in a position to pick and choose. As remarked by one manufacturer in this city, "it is a poor concern that cannot obtain orders at present, with so many floating about." The excellent condition of trade in this respect is due in part, also, to the continuance of the molders' strike. It is not easy to obtain castings, and considerable machine work locally is held back by that scarcity. The shops that are in operation are overrun with business and when full activities are resumed, or when the strikes are wholly eliminated the manufacturers of machinists' supplies may have a slighter surplus of orders.

A few machine shops have closed down within the last few days because of inability to obtain material. Others have been on the ragged edge of uncertainty, managing to keep running by picking up here and there a scant stock of needed material, but with the permanent outlook for the future by no means assured. Naturally these manufacturers have been slow to order freely of those classes of supplies which are in abundant stock, and trade in consequence has not been as brisk as it was two months earlier.

But beneath these surface obstructions to trade the situation is everything that could be desired. The same manufacturers who are now refraining from purchases said three or four weeks ago that they had more business in sight than they could attend to. This business has not been killed, but is merely hung up until better material supplies give renewed ease to the situation.

C. H. Besly & Co. are selling Gardner grinders as fast as they can make them and quite recently shipped a carload to the Eastern States. E. A. Delano has sold 1,500 pulleys to one concern alone in North Dakota and reports an excellent demand for molding machines, especially from the South. The Dodge Manufacturing Company is busy in every department and sees no diminution in the very excellent trade that has been present all summer. The Northampton Emery Wheel Company says trade in August was exceeded only one month this year and that it was the best August in many years. On the whole, trade for machinists' supplies may be somewhat less than two months ago, but is nevertheless quite satisfactory.

Quotations.

NEW YORK, Monday, Sept. 9.

Pennsylvania Foundry Pig Irons, Jersey City delivery:

No. 1 X	$15 15 @ $15 65
No. 2 X	14 65 @ 15 15
No. 2 plain	14 15 @ 14 65
Gray forge	13 50 @ 14 00

Alabama Pig, New York delivery:

No. 1 foundry, or soft	15 00 @ 15 25
No. 2 foundry, or soft	14 25 @ 14 50
No. 3 foundry	13 75 @ 14 00
Foundry forge, or No. 4	13 25 @ 13 50

Bar Iron—Base sizes—Refined brands, mill price on dock, 1.63c. in carload lots; from store, 1.90 @ 1.95c. in small lots.

Tool Steel—Base sizes—Good standard quality, 7c.; extra grades, 10c. and upward.

Machinery Steel—Base sizes—1.90 @ 2.00c. from store.

Cold Rolled Steel Shafting—Base sizes—From store, 2½ @ 2¾c.

Copper—Lake Superior ingot, 16½ @ 16¾c.; electrolytic, 16⅜ @ 16⅝c.; casting, 16 @ 16⅜c.

Pig Tin—About 25½c. spot for 5 and 10-ton lots, f. o. b.

Pig Lead—For wholesale lots, 4⅜c., with .02½ @ .05c. extra for carloads.

Spelter—4.02½ @ 4.05c.

Antimony—Hallett's, 8½c.; cheaper brands, 8¼ @ 8⅜c.

Lard Oil—Prime City, 73 @ 76c. in wholesale lots.

The Pan-American Exposition—II.

It has always been the experience of this paper that the collecting of material from which to adequately show the exhibits at a large fair is no easy matter, and to this rule the fair at Buffalo is no exception. It is not the intention to present a mere list or catalog of the exhibits, as it is doubtful if the readers of the paper would read such a list with more than a very languid interest. On the other hand, it is not to be expected that in the short interval that has elapsed since the Paris show, there would be any large number of novelties to be found in Buffalo. There are some such, however, and they deserve more than a passing notice.

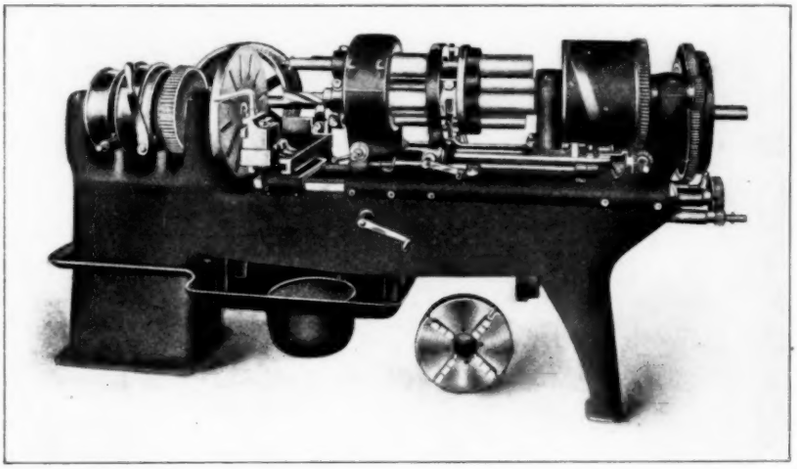


FIG. 1. CLEVELAND MACHINE SCREW COMPANY'S AUTOMATIC CHUCKING MACHINE.

THE CLEVELAND MACHINE SCREW COMPANY'S EXHIBIT.

This company has one of the largest individual mechanical exhibits of the entire fair. Its leading new feature is a chucking machine, shown in Fig. 1, which is full automatic except as regards the changing of the pieces of work.

While the machine embodies many of the principles of the Cleveland automatic screw machines it also contains several departures from that machine, of which the most striking lies in the fact that the tools do not advance together. Each tool is mounted on a bar of its own, these bars forming a sort of lantern which is carried in a revolving and sliding head. The lantern revolves with this head to present each tool to the work, and the head is adjustable endwise to provide for long work and to give short overhang with short work. The leading reason which has led to the adoption of this arrangement is the desire to get the tools out of the way while not in action, so as to avoid interference with many of the odd-shaped pieces on which such a machine will naturally be employed.

In a machine for operation upon castings provision must of course be made for the use of a great diversity of tools, and Fig. 2 shows two standard methods of mounting such tools on the ends of the tool bars. The bar *a* is hollow and is split at its outer end; and for holding small tools like the one shown in the lower illustration, for example, the shank of the tool is inserted within the bar and a clamping sleeve is made to pinch the bar upon it. For larger tools the method shown at the top is used, a piece being inserted within the tool-bar to prevent it from collapsing, and the tool-holder being then clamped upon the bar by a split grip.

The regular Cleveland screw machine is shown with a magazine attachment for operating upon the second end of studs and similar pieces. The attachment stands in the usual position of such attachments, one hole of the turret being occupied by a conveyor which removes a piece from the magazine and later on inserts it in the chuck. The conveyor is shown in Fig. 3. The stem *a* turns freely within the bush *b*, the spring cup *c*, formed in one with the stem, being of a size to suit the studs to be made. The spring cup grasps and removes the piece from the magazine, and after inserting it in the chuck and after the jaws are tightened, the cup revolves with the stud until the turret is withdrawn, and the cup is thus pulled off the stud. An adjustable screw stop *d* provides for the use of the conveyor with various lengths of work.

Another interesting novelty in turret lathe tools is an inside recessing tool for making cuts similar to the one shown in Fig. 4. The tool is held in the turret and is advanced to position by the advance of the turret. When in position the cross-slide acts upon the pendant pin *a* and turns the tool-holder. The stem of the holder and the sleeve which carries it are eccentric, and the turning of the former swings the tool into the cut in the manner shown in the small details of the illustration.

Fig. 5 shows a much needed machine

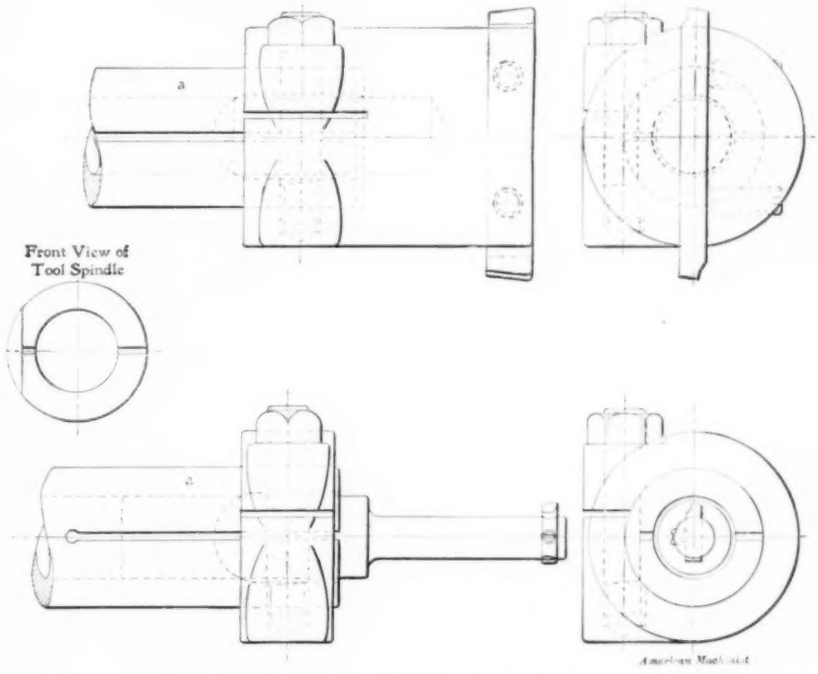


FIG. 2. METHODS OF CLAMPING TOOLS TO THE TOOL BAR.

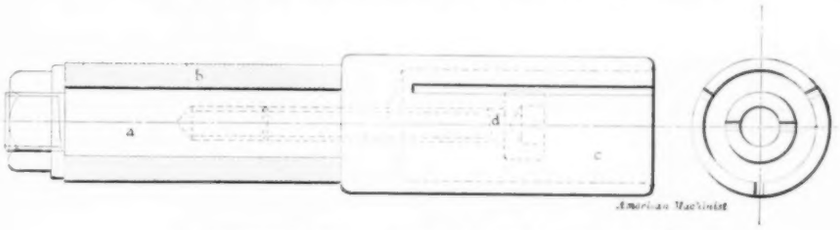


FIG. 3. CONVEYOR FOR USE WITH MAGAZINE ATTACHMENT.

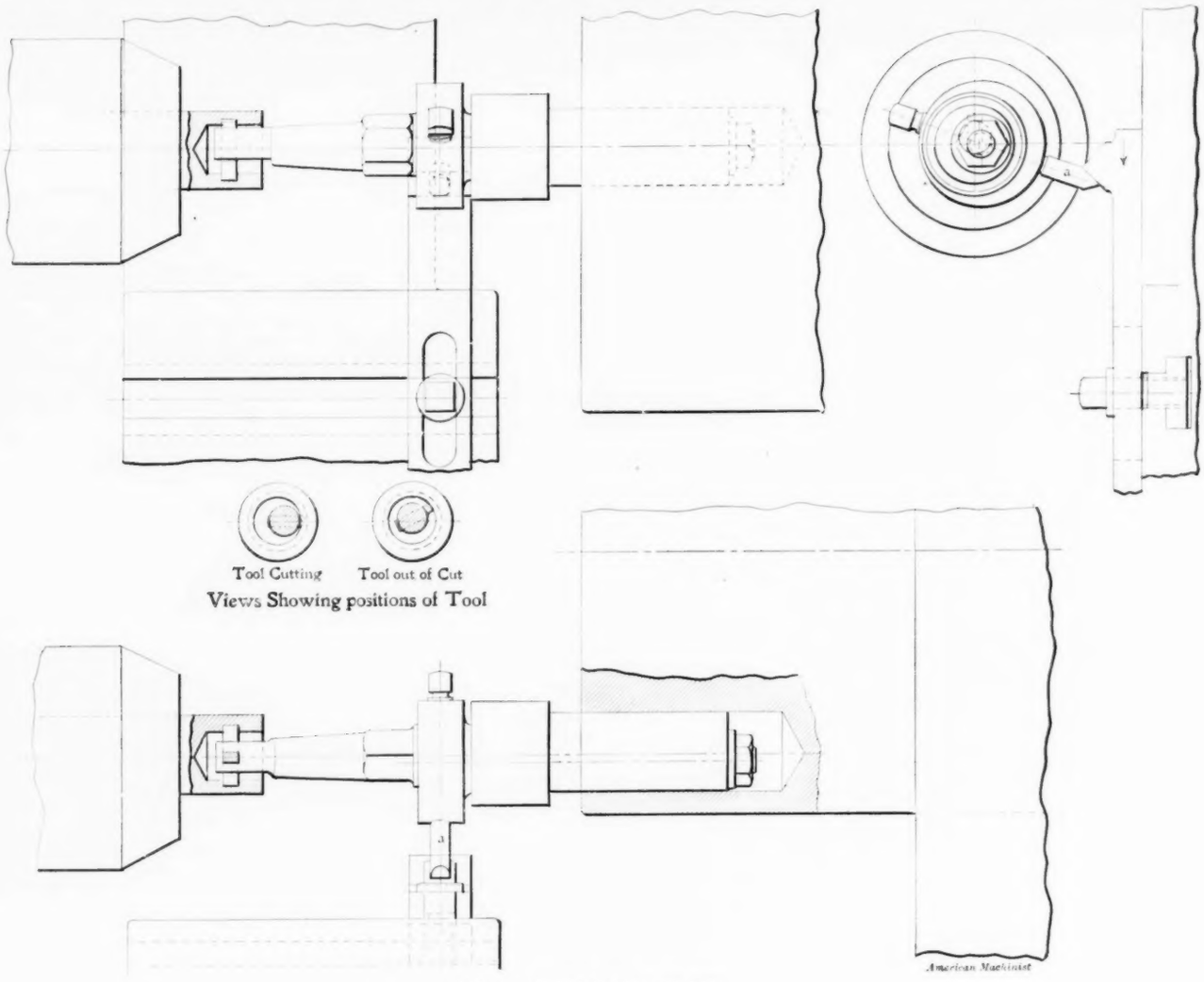


FIG. 4. INSIDE RECESSING TOOL.

for grinding circular forming lathe tools, which is also included in this exhibit. It is well known of course that unless such tools are correctly ground they will not produce the desired profile, but nevertheless there has been no means of grinding them correctly except by an expensive, full-fledged surface grinder. The illustration shows a simple special machine for this purpose and is almost self-explanatory. The tool is mounted on a knee fixture, or the holder in which it is held in the lathe may be used, and by the operation of the hand wheels and lever the grinding is quickly done. Means will be seen to be provided for turning the tool about its axis as well as for raising it bodily by the elevating screw under the knee.

Another feature of this exhibit is a two-hole automatic turret lathe for simple work. The turret carries two tools, and the cross slide two more. The positioning of the stock before tightening the chuck is by a swinging gage stop.

An automatic turret machine fitted with a cross drilling attachment for electrical instrument binder posts, etc., is also shown.

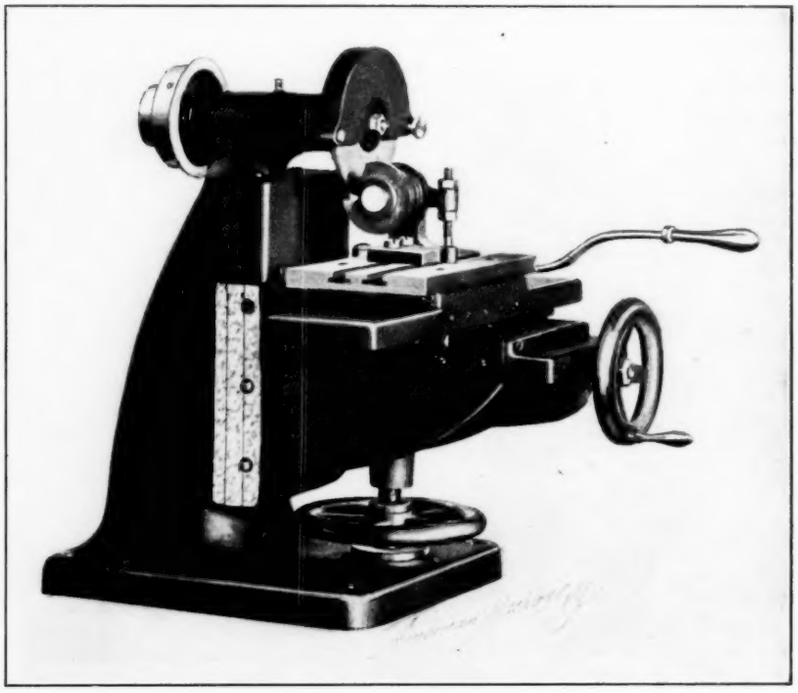


FIG. 5. MACHINE FOR GRINDING CIRCULAR FORMING TOOLS.

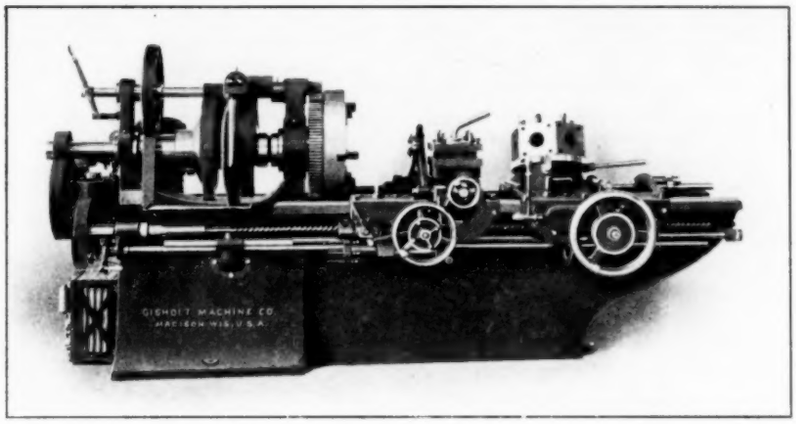


FIG. 6. FRONT VIEW OF GISHOLT MOTOR-DRIVEN LATHE WITH QUICK TURRET TRAVERSE.

THE GISHOLT MACHINE COMPANY'S EXHIBIT.

The leading feature of the Gisholt Company's exhibit is one of their well-known turret lathes having a motor drive incorporated with it and having also the addition of a quick power traverse to the turret.

Front and rear views of this tool are shown in Figs. 6 and 7. The motor is by the Northern Electric Company and is fitted with their system of speed control. The rear view shows the manner in which the motor is connected with a gear mounted on a quill on the main spindle, this gear and quill taking the place of the usual cone pulley. From this quill two sets of back gears are arranged, one of which acts through the spindle and the other through the face plate or chuck. The method of manipulating the speed of the motor is shown in the front view. Attached to the gear guard are two push buttons, one of which serves to increase and the other to decrease the speed. A push of the proper button raises the speed one step, a second push another step, and so on, while one or more pushes of the other button serves to drop the speed step by step in the same manner. These pushes may follow one another very rapidly and the desired speed be quickly obtained. Six steps or speeds are provided in this way, to which number are to be added those

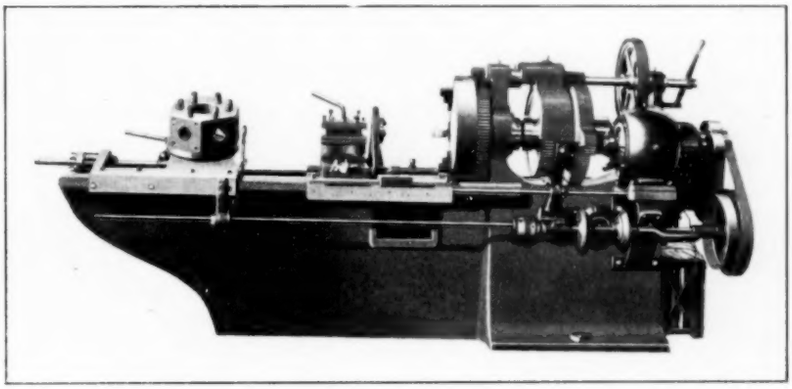


FIG. 7. REAR VIEW OF GISHOLT TURRET LATHE.

obtained through the two sets of back gears.

The quick power traverse to the turret operates in both directions and automatically disengages itself at the end of the movement, and a friction clutch in the traversing mechanism secures absolute safety. The rear view indicates the manner in which this quick traverse is obtained by belt connection with the motor and the manner in which it is operated by the movement of a lever on the carriage.

The leading field of usefulness of this turret traverse is in connection with work requiring the use of tools carried by both the turret and the carriage, as, for instance, commutators, for which the machine set up in Buffalo is equipped. Having finished the work with the turret, the operator throws in the quick traverse. When the tool has withdrawn from the work the turret is revolved for the next tool, and as the traversing movement, when completed, disengages itself, the operator need not wait for it, but may transfer his attention at once to the carriage tools.

This company also exhibits one of its tool grinders fitted with a Northern motor, as shown in Fig. 8. The motor is dust and water proof. Such an application of motor driving is obviously a very appropriate one, and I am informed that this has been found to be very satisfactory.

F. A. H.

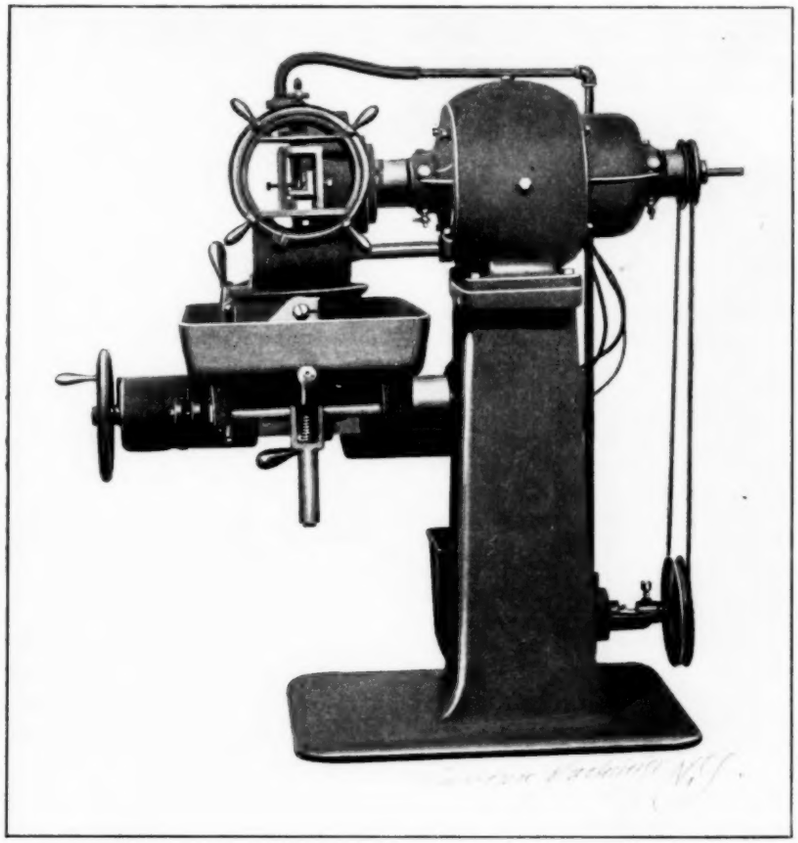


FIG. 8. GISHOLT MOTOR-DRIVEN TOOL GRINDER.

The Power Press in Agricultural Machine Work.

BY WILLIAM DORAN.

PUNCHING HEAVY STOCK.

The use of the power press for the cheap production of small sheet-metal parts has progressed in a truly wonderful manner during the past few years, and not only in the production of small parts, but also for heavy stock as well. The power press has demonstrated its efficiency for turning out work formerly—and even now, in a large number of shops—produced by the milling machine, the drill press and the forge. Especially is this so where the parts produced are of flat soft steel or iron, and in no line of manufacturing has the power press been put to better use than in the manufacturing of agricultural machinery. To anyone who has had the privilege of going through one of the various shops devoted to the manufacture of agricultural machines, or of working in one for any length of time, the fact is evident that in them machine manufacturing of this type has certainly reached a point far ahead of the general run of machine practice. In mowing and reaping machines a majority of the parts are of flat or round stock, fastened and assembled by riveting, as in the case of the wheels for such machines, the only cast part of which is the hub.

A short time ago I was fortunate enough to spend some time in the shops of one of the largest agricultural manufacturing establishments in the country, and while there I was struck by the methods of manufacture; so much so that I made a note of a number of things which were very interesting. The thing which impressed me most was the rapidity with which the work was handled, sent through the different operations and assembled. Strange as it may seem to some, the quickest and most satisfactory results and the most ingenious attachments and fixtures for the production of the parts were accomplished by and used on the power press.

Take, for instance, the wheels for the mowing and reaping machines. The tires for these wheels are of ribbed soft iron, are first cut off to the required length, and then have the holes for the spokes, straps and fastening rivets punched in them. This in itself is an interesting operation and goes to show the large scale on which press work and punching is carried on in these shops. The tires, before being rolled, are almost 10 feet long by 7 inches wide and ⅜ inch thick, and the number of holes runs from eighty-one to ninety-three, all punched at one stroke of the press. The design and construction of the punches and dies for these tires entail a lot of accurate work, the punches being so placed and finished as to make the punching of the holes successive. The diameter of the holes is usually ⅜ inch, and when it is considered that ninety-three of them are punched through ⅜-inch stock at one stroke of the press, the size and construction of the press can be imagined. In this operation on the tires there was one little kink which struck me as particularly novel and labor-saving. The holes in the tires, into which the spokes are to be entered and riveted, are so punched as to be larger on one side than on the other; so that when the spokes are upset and riveted, the larger portion of the hole will be on the outside, and when the spoke is upset it fills in the hole and is finished flush with the tire, thereby fastening it permanently without the possibility of pulling out, and

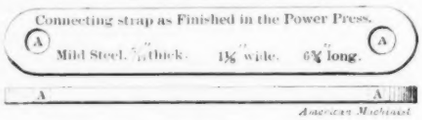


FIG. 1. THE STRAP TO BE PUNCHED.

doing away with the necessity of countersinking the holes, which would require another operation. This peculiarity of the holes is accomplished by making the dies somewhat larger than the punches.

After the holes have been punched in the tires, the ends are brought together and fastened by riveting a wide strap on the inside. The spokes are then entered into the holes, the two sections of the malleable iron hub are fastened to them and trued, and the ends of the spokes riveted within the tire. The cross straps are then fastened to the outside of the tire, the hub is set and riveted and the wheel is complete. The different operations on the parts (except on the hub) and the assembling and fastening of them together are all done under the power press, no screws being used, all parts being riveted throughout. The foreman of the department where the wheels were constructed told me that the capacity of the department was 200 wheels for a day of ten hours, making the time for the complete finishing of one wheel three minutes, which is, to say the least, rapid production indeed, and to those who have never seen it done, well nigh impossible, while to those standing by and watching them being manufactured, it is wonderful.

As a simple instance of the use to which the power press is put in this shop, I show in Fig. 1 two views of a mild-steel strap, finished complete to the shape shown—*i. e.*, piercing the hole *A* at either end, cutting off to the required length, and finishing the ends to the radius shown, in one operation. These straps are used, when finished, on the wheel tires, there being sixteen to each tire; the straps, after being punched, being formed in a separate operation to conform to the curve of the outside of the tire, in such a manner as to allow of their being fastened at an angle of 45 degrees with the sides of them. The straps for the tires are finished to 6¼ inches long; but as a number of different length straps, with holes of the same size and in the same position, are required for other parts of the machines, the one punch and die is so constructed as to allow it to be used for all of them.

The design and construction of this punch and die are clearly shown in the vertical cross-section, Fig. 2, and in the plan of the die, Fig. 3. The steel used for the die *T* is of the "Bogert" brand—half iron and half steel—and, as shown, is quite heavy. The use of this composite steel and iron for dies for punching heavy stock tends to the longevity of the die, and also gives better results when hardening, reducing the shrinkage to the minimum, and overcoming as far as possible the tendency to crack or warp. The stripping plate *S* is of heavy mild steel and is fastened (together with the gage plate *O*) to the die by means of two cap screws *M M*, and located by the two dowels *N N*. The holes in the stripper for the two piercing punches are countersunk, as shown, to allow the piercing punches to be as short and stiff as possible. The gage plate is of ⅜-inch thick stock, planed on all sides and long enough to extend out from the left end of the die 13 inches. It has a channel or slot cut down through the center at *P*, to admit the sliding stop *R*, which is fastened by the cap screw *Q*, thus allowing of adjusting the stop for different lengths of straps.

The punch is shown in Fig. 2. It is made as rigid as possible, the cutting-off and finishing punch *C* and the holder *B* being a forging, the punch proper of tool steel and the holder of mild steel. The two piercing punches *G* and *F* respectively are of ⅞-inch round annealed tool steel, let into the holder as shown and fastened by the set screws *E E*. The small holes *D D*, at the back of the holder, are let through to allow of removing the piercing punches with ease. The two piercing punches are made one thickness of metal longer than the cutting-off and finishing punch *C*, so that the holes in the work will have been pierced, and the punches entered the dies, before the cutting-off and finishing punch performs its operation. This insures the rigid holding of the metal and the accurate sizing of the straps, and, also, as it makes the punching of the work successive, the strain on the press is reduced. The punches are made so that the cutting-off and finishing punch *C* is a trifle loose in its die, and the piercing punches *G* and *H* very much so. This leaves the two holes *A A* in the strap considerably larger on one side, which is required for the rivet to fill out in and finish flush when the straps are fastened to the tires.

When the die is in use, the adjustable stop *R* is set to take in the length required, and the metal to be punched (which comes in 20-foot lengths) is fed along a guideway, under the stripping plate *S*, and held snugly against the gage plate *O*, allowing it to project halfway over the finishing die. At the first stroke of the press, the end of the stock is pierced and then trimmed and finished. It is then fed along and against

the stop R, and at each succeeding stroke a complete strap is produced. Before punching, both sides of the stock are "slushed," which makes the cutting clean and regular and leaves the ends of the straps without burrs or fins.

To the practical man, the sight of parts (of which the above is a sample) being produced by punching, starts him wondering why this machine tool, the power press, has not been adopted more extensively, not only in the manufacturing shop but in the jobbing shops. When it is considered that tools and fixtures are being constantly designed and constructed for the finishing of work by milling and drilling, which could be accomplished in the power press in half the time, by means of dies of the simplest and most inexpensive design and construction, the failure to do so is astonishing. In fact, there are any number of shops throughout the country where duplicate small parts—and large ones, too—of standard design and sizes are being used in large numbers, for various special machines and attachments, which are being manufactured by drilling, milling or otherwise, which could be produced at half the cost, and to a finer degree of interchangeability, by means of simple dies and fixtures in the power press; that is to say, using sheet-metal blanks instead of castings, where practicable—and they certainly are practicable in a great many cases, and the lightness and fine finished appearance of the blanks, and the strength and stiffness of formed, drawn or bent work add greatly to the beauty of the machines or appliances to which they are affixed, and in many cases improve the working qualities as well.

It is a common sight, when going through machine shops in any of the up-to-date localities, to see a number of power presses punching away and producing duplicate and interchangeable parts, which were formerly produced by drilling or cutting out with a chisel, and then filed or milled down to size. These shops understand the full value of the power press as a machine tool, and it has become (in shops where it is understood) as great a factor in production and successful manufacturing, as any of the other tools in general use. It is really too bad that business reasons and certain secrets of manufacture make it almost impossible for a stranger to get the privilege of going through establishments devoted to the manufacture of agricultural machinery, and that they are so conservative about admitting anyone to their plants, as, were it otherwise, it would pay anyone who is interested in the manufacturing of machinery to pay them a visit; for in them modern manufacturing is carried on in a manner which is far ahead of other lines, both as to cheapness in production and as to the efficiency and working qualities of the output.

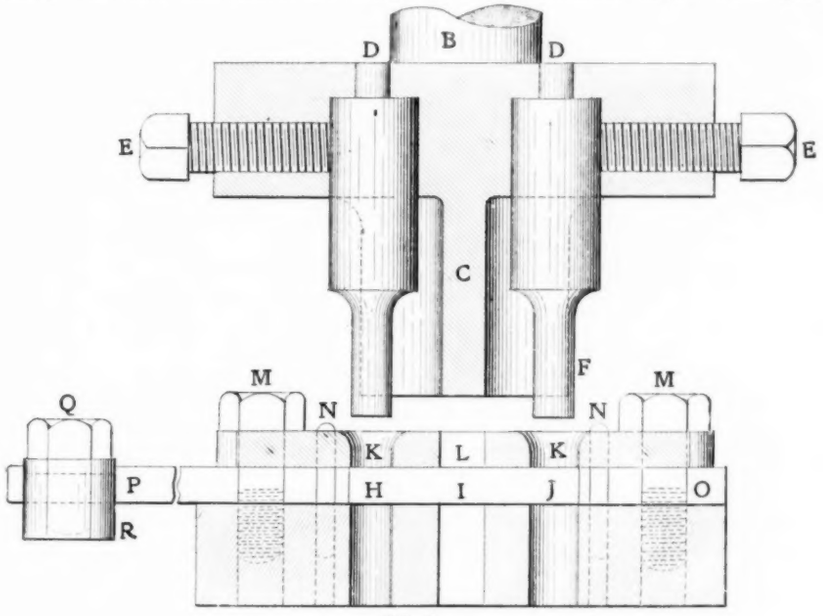


FIG. 2.

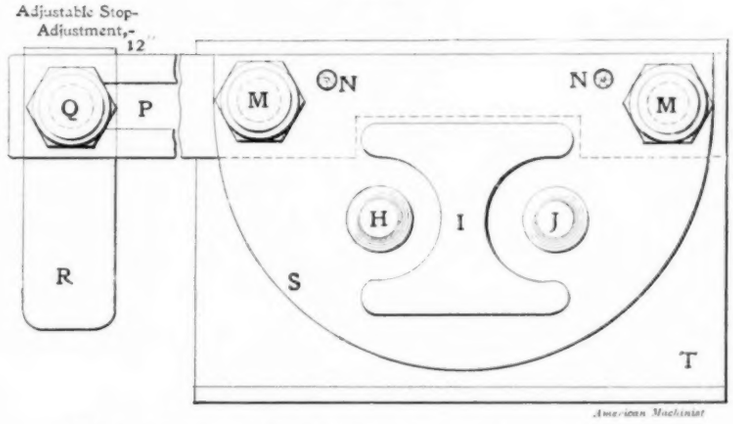


FIG. 3. PUNCH AND DIE FOR STRAPS FOR AGRICULTURAL WORK.

The Jig Habit in America.*

BY OBERLIN SMITH.

The subject we have in view deals not only with those tools known as jigs, but with analogous tools of various kinds which are used for cheaply reproducing certain predetermined shapes and locations. The grand principle of the reproduction and duplication of artistic and utilitarian forms, the originals of which were the direct embodiment of the careful thought of the artist and the engineer, is in some manifestation or other, almost as old as the world itself. The most obvious, and perhaps the earliest, application of this principle was doubtless seen in the molding of plastic materials which could be afterwards hardened, as clay, soft metal, etc. After the world had long been accustomed to the use of molds of various kinds, the products of which could be numerously duplicated, the most notable application of the general principle which appeared was undoubtedly shown in the art of printing—from permanent engravings and afterwards from movable types. Other instances of this principle may be seen in the making of chromos and other lithographs; in the use of stencils; in the coining and stamping of metals by the use of presses and dies, and in casting metals and other substances.

A further application, differing somewhat in principle, may be seen in the use of turret lathes and similar devices, where cutting tools are arranged for an exact repetition of their proper location, to avoid hand adjustment for each piece of work to be operated upon. A somewhat similar principle may be seen in profiling and pattern-turning machines, so called, where the movement of cutting tools is governed by their being made to follow a master model of the work to be produced. Another instance of the same principle is seen in Jacquard looms and other weaving machines where a prearranged design, fresh from the soul of the artist, is duplicated numberless times by the use of automatic machinery, attended by cheap labor. Still another application of the principle, and one in which we are more interested this evening, is the use of gages, templets, cradles and jigs, these being chiefly used in the paring and cut-

*Abstract of a paper read before the Franklin Institute.

ting, to exact finished shapes, of pieces of metal which have been more roughly formed by the processes of casting or forging.

The functions of a cradle and jig are sometimes combined with those of the drilling or boring machines in which they are used, in the shape of a special machine which is fitted for one purpose only and which is adapted for locating the work to be operated upon, as well as the tools, in absolute predetermined positions. A good illustration of such a machine is seen in the special multiple-spindle driller which is used for boring, counterboring, facing, reaming and tapping all the holes in a mowing machine frame, at one operation, with the assistance of cheap labor. This machine works with sufficient accuracy for the purpose, and in one-tenth or one-twentieth of the time that would be required by ordinary methods with good machine tools and high-priced workmen.

Speaking first of gages, which are well enough known to make a detailed description unnecessary here, even were there time to treat of the numerous forms in which this tool appears: their general function is to inspect and verify standardized measurements. In accurate work, limit gages (so called) are frequently used, one representing the maximum and the other the minimum sizes, which are allowable, the work varying between these limits at different times and to different degrees, such variations obviously representing human fallibility when attempting absolute accuracy. The purpose of a gage is usually not so much to locate the position of various finished surfaces in a piece of work, as to inspect them and report upon them after they are so located.

Going a step farther we have tools known as templets, which are usually flat pieces of metal (often thin sheet metal) which are laid upon various surfaces of the work, being located by the eye or by proper flanges, pins, etc., certain edges of the templet, interior or exterior, being used to rest a scriber, or other pointed marking tool against, while marking the position of exterior edges, or of holes or grooves to be cut below its general upper surface. Such a tool will, of course, reproduce marked lines with considerable accuracy, but the drilling or cutting to these lines afterwards is subject to various errors, depending somewhat upon chance and somewhat upon the skill of the operator. If we make a templet thicker than usual and fasten it securely to the work, using the locating edges for the actual guides for cutting tools, we have the simplest form of flat jig. When the exterior edges of such a jig are used to locate finished edges in the work, the tool is often known as a filing or milling jig, as the case may be. By far the most usual function of a jig, however, is to locate cylindrical holes of various sizes and kinds as made by frills and other boring tools. The simplest form of flat-jig is usually a plate of steel with certain holes accurately drilled through it at right angles to its upper and lower surfaces. If these same holes are to be drilled in a rectangular block of metal, for instance, of the shape of an ordinary brick, as represented by the wooden model I hold in my hand, then it is obvious that if the same is laid upon the horizontal table of a vertical drilling machine, with a jig clamped upon the top of it the external edges being made to coincide by the sight or feeling of the operator, the holes in the jig may be exactly reproduced, as regards location, in the piece of work—providing the drilling tools fit the holes in the jig without shaking. Furthermore, these drilled holes may be made of any desired depth by proper adjustable stops to limit the downward motion of the drill-spindle.

In practice, such a jig as is above mentioned is often made somewhat in the form of a box-lid with downward projecting flanges or pins to slip over the work, so that it need not be located by hand. Sometimes, clamps, screws or other fasteners are used upon one or more sides of such a jig to pull it over in one direction, so that it may be located by certain fixed edges of the work which are the most suitable. Should the work vary somewhat in size, as is the case with rough castings or forgings, it is sometimes desirable that the clamping should be central and should be done from all directions, somewhat after the manner of a universal chuck. A jig of this sort may in general be called a lid-jig.

Carrying development still further, we have the box-jig which stands upon its own bottom, so to speak, and into which the work is dropped and clamped in various directions, sometimes by the action of closing the lid—which may be hinged or otherwise secured thereto. If it is desirable to drill holes variously located and parallel to each other, in one direction only, through the piece of work in question, the jig, of course, always stands upon its bottom. It may, however, be required that other holes in other directions shall also be drilled. Thus, it is often the case that a jig, if of an approximately cubical shape outside, is turned over upon several or all of its six sides, the holes being drilled, of various depths, from any of the six directions, represented by lines normal to the various sides of a cube. Should still other directions be required, the outside of the jig can, of course, be made with various working "bottoms" upon which it can be temporarily laid. These can be at any desired angle with each other, and each is, obviously, placed opposite to the surface where the holes are provided for the drill to enter.

One of the most common illustrations of the use of jigs of this sort is found in the drilling of sewing-machine frames, where the work usually consists of an iron casting of very irregular shape. Being dropped into its jig, it is located by certain surfaces which are most favorable for producing uniformity; in some cases some or all of these surfaces being previously finished by milling, or otherwise. This jig is then slid along upon the table of a gang drilling machine, each spindle of which carries the proper tools for drilling, boring, reaming or tapping certain holes. The downward stroke of each tool is governed by a proper stop, and thus, by cheap labor, any number of accurate holes may be located and drilled in rapid succession by a proper manipulation of the jig, it resting on any desired bottom and being pushed along from one drill spindle to another. In such case the work is, of course, not disturbed in its position in the jig during the complete operation in question.

In some cases a simpler form of the above named jig can be used, the general shape of which is a flat with various legs projecting downward. Its general form may appropriately give the name of stool jig to a tool of this kind. The work is placed between the legs and clamped up against the plate, not having a proper bottom of its own on which to rest, as is the case with the lid jig. Another modification of the box jig may be known as a skeleton jig, which, instead of having complete sides enclosing the work, is made in the form of a light skeleton frame. This tool is often necessary in heavier work than that above described, where it is desirable to save weight as much as possible in order that the operator may be able to easily handle, unaided, the combined jig and work.

It is obviously impracticable to treat heavy castings, such as the beds of lathes or the frames of large presses, in the jigs above mentioned. In such case it is well to do the turning, milling and planing by ordinary methods, locating the finished surfaces by various gages and templets, after which local jigs, as they may be called, are applied for accurately locating holes by some of the finished surfaces already produced. These jigs are made to suit one or more holes, as the case may be. Being small enough to handle conveniently, they may be placed in succession on various parts of the large piece of work in question.

In making large jigs a very important point is to make them light for easy handling, but yet to get the utmost stiffness possible by very careful designing, that they may not warp, bend or twist when fastened to the work, thus throwing the holes, etc., out of place. It is usually best to use cast iron for the frames of jigs, because the working parts will maintain their position unless strain enough is brought upon them to actually crack the casting. Jigs, on the other hand, made of forgings, steel castings or brass castings, are apt to bend without its being known, thus destroying their accuracy and per-

haps spoiling large quantities of work before the error is discovered.

In jigs for accurate work, and where large quantities of pieces are to be made, all holes should be bushed with hardened and ground steel bushings, made to standard external diameters that they may be easily replaced when their interior surfaces are worn by drills or other boring tools which revolve therein. In jigs for making work in large quantities these bushings are usually securely fastened in place, but so that they can be knocked out when too much worn. In other cases, where the jig is used for larger work and has to perform upon but few pieces at a time, interchangeable bushings are often employed, a full set of them being kept in the toolroom which can be used at random in various jigs.

Cheap jigs for a small quantity of work are sometimes made by drilling the working holes through the body of the cast iron of which they are made. These, of course, are durable only to a limited degree. In some cases, instead of bushing each hole, a hardened steel plate, with the proper working holes drilled through it, is fastened to the frame work of the jig proper. One difficulty in this system, however, consists in the fact that the warping of the steel in hardening is apt to somewhat displace the holes in their relation to each other.

The title of this paper implies that there is a state of mind and a state of practice known as a "jig habit." The tendency to use not only jigs themselves but analogous tools embodying the same grand general principle for the accurate and rapid development of interchangeable parts of machines and other structures may be termed a habit of mind. Why this mental condition is prevalent in certain places and with certain people more than at other places and with other people, is a question for the phychologist. That it does exist in a greater extent in North America than in other countries in the world, and that it is found more especially in that class of Americans (no matter where they are born) whom we may term "Yankees," is, I think, an indisputable fact. These people are of a class who are born to be mechanics and who have been brought up in an atmosphere permeated with intense practical energy. The American who possesses this habit (usually both born and acquired) seems to have been developed during the last hundred years or so by reason of coming, in the first place, from good English and other European stock in whom common sense is a chief characteristic. The evolution of the jig habit seems to have come from these men being cast upon their own resources in a new country, where novel and original methods were often forced upon them, and where much freedom of thought and action enabled them to study for themselves methods which would allow them to carry out their mechanical ideas upon the most economical basis—not only for the love of the money to be procured thereby, but from an innate love of mechanical things put into their simplest forms.

The Skrimshanker.

"Indian Engineering," of Calcutta, India, discourses interestingly upon the skrimshanker. The skrimshanker is assumed to be a civil engineer employed in railway construction and maintenance, but the portrait will doubtless be recognized as that of a not infrequent habitué of the American machine shop. Indeed, he is probably to be found in many lands, and everywhere a nuisance. We quote as follows:

"He is an unutterable nuisance, and the older he grows the worse he gets. His principal idea is to save trouble, not to other people, but to himself, and at the same time to appear to be working double tides. He never goes straight at a job if he can help it, but learns to crawl under it, or get round it, or to shift it to someone else's shoulders; or most frequently of all, to make out that it is unnecessary or impossible. The last is a very favorite dodge, as no one can be expected to attempt the impossible; and when shown that it is not only possible but easy if tackled in the right way, he is not only surprised but apparently delighted as well, so much so that his employer is completely deceived.

"Then he is so plausible; can talk away about his work, and show a considerable knowledge of it. No one is so busy, when observed; and no one bustles about and damns his men more energetically than he, when a superior is anywhere near. When the superior is quite gone, our friend must have a rest, poor fellow, which lasts until 'the boss' is likely to return. When spoken to about his work, he appears to take a great interest in what is said, and to know a great deal, too; but as for putting that knowledge in practice, he is much too wise to waste it so unnecessarily.

"He is a great hand at 'giving orders,' and thinks that by doing so he gets rid of all responsibility. He is quite surprised at the idea, when imparted to him, that it is any part of his duty to see those orders carried out. Having given them he considers that his share of the work is nobly completed, and that any subsequent failure has nothing to do with him.

"If caught young, and before he has made himself thoroughly versed in the tricks of the trade, the skrimshanker may be cured and made a decent workman; but as he grows more experienced he accumulates so many dodges of evading work, and acquires such a stock of formulæ of excuse, that he at last becomes simply hopeless. It is easier in fact to do his work oneself than to listen to his reasons for not doing it. He is often a good fellow—off his work—and is then more difficult to deal with, as he gets on his chief's soft side and manages to put in a word now and then which would make anyone believe that he is really killing himself with hard work. He is at times a dangerous man to tackle, as he is very quick in detecting any mistake in an effort to bring him to book, occasionally even turning the tables, as truth is as a general rule with him quite secondary to his own interests.

"There is one plan of catching him which has been known to succeed: to give him a piece of work of fair difficulty to do, with every facility, but removing every outside source of aid, so that if the work is done he must have done it himself. It may seem unfair to deliberately set a trap of this kind; but the trap is set full in his sight and it is purely his fault if he walks into it; and again he is such a nuisance that any device not actually underhand is permissible which will expose him.

"In fact, the best way to cure the young and make the best of the old skrimshanker is never to leave him any excuse for not doing his work. See that he is not asked to do too much, that he has full directions, and is furnished with tools, instruments and men; any failure will then be so obviously his own fault that he may consider it wisest to exert himself. It is very probable that many men are spoiled and turned from being fairly industrious workmen to mere excuse-mongers by being asked to do too much and by being called on to account for not carrying out instructions that were insufficient to start with, or for not doing work for which they were supplied with neither materials nor men. The Israelites, for all the driving of the overseers, probably had on the whole an easier time when denied straw; a sleep in the fields when getting stubble was worth a beating at night. It is only the exceptional man who *will* get his work done in spite of obstacles, but such men are few. The best 'boss' is not he who turns away every man who does not work himself to death, but he who makes the best of everyone that works under him—good, bad or indifferent."

The Machine Trades and Professions Association, of Columbus, Ohio, has arranged a series of open meetings to begin with four or five lectures by President Crow of the association, who is the blacksmith of the State University, on "the nature of iron and steel, and how to work them in the forge, cupola and machine." Other lectures of interest and importance will follow and they will be practically free to whoever may choose to attend.

A brass founder recommends for making thin aluminum castings a dry, hot mold sprinkled with resin. This draws the metal into all the chambers. The molten aluminum should be poured at as low a heat as possible.—"The Engineer."

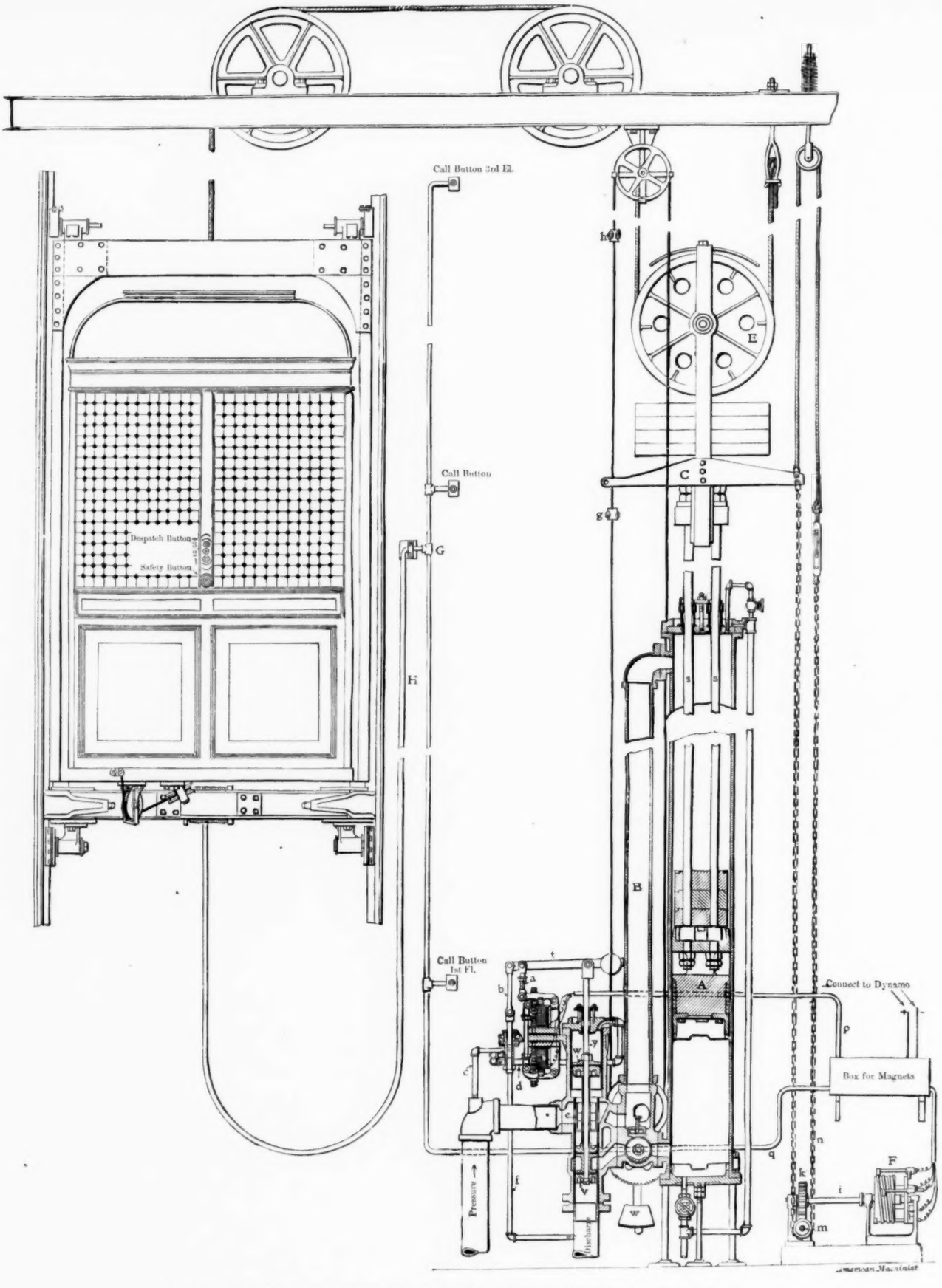


FIG. 1. GENERAL ARRANGEMENT OF ELECTRICALLY CONTROLLED HYDRAULIC ELEVATOR.

Electrically Controlled Hydraulic Elevators—I.

BY WM. BAXTER, JR.

Elevators installed in private houses are, as a rule, arranged so as not to require an attendant. To fulfill the requirements in such cases the controlling arrangements must be such that the car may be moved not only from within, but also from any floor, so that if a person is at the top of the house and the car is in the basement, he may be able to bring it to the upper landing. When an elevator is used as a dumb-waiter it should be arranged so that the car can be operated from any floor, just as in the case of a house elevator, and in addition it should be possible to set the car in motion from any floor and cause it to stop at any other floor. These various results can be accomplished in a very perfect manner by means of electromagnets and suitable circuit connections between them and push buttons in the car and at the various landings. The Otis Elevator Company makes use of several designs of this kind, some being intended to be operated by current obtained from the ordinary incandescent lighting circuits, and some to be operated by alternating currents, or by primary batteries. When a battery current is used to operate the controlling mechanism, the latter has to be arranged so as to move with a very small effort, as energy derived from primary batteries is expensive and cannot be used at a moderate expense except in small doses.

In this article we will describe the arrangement used in connection with direct current incandescent lighting circuits. The general relation of the car, the hoisting mechanism, the electro-magnetic controlling devices and the connecting circuits is shown in Fig. 1. The hydraulic cylinder and the actuating valves are the same as those already described in previous articles, with the exception that the pilot valve, instead of being moved by the rotation of a hand-rope sheave, is operated by means of electro-magnets. These magnets act to lift or draw down the connecting rod *a* and thus move the lever *t*, and thereby the pilot valve, through the connecting rod *b*. When the magnets draw *a* downward, the pilot valve descends, and thus opens communication between pipes *c* and *d*, and the water in the pressure pipe has free access to the upper side of the differential piston *w*. In this way the main valve *v* is moved downward. The upward movement of *a*, by the electro-magnets, lifts the pilot valve and places the pipes *d* and *f* in communication, thus permitting the water above *w* to escape into the discharge pipe.

The action of the electro-magnets is controlled by switches that are moved by other magnets, and which are contained in the box for magnets shown at the right of the drawing. The connecting wires between these switches and the electro-magnets that operate *a* run through the cable marked *p*. The wires from the dynamo, or the lighting circuit, are connected with the switch magnets in the manner indicated.

From the switches in the magnet box several wires are run to the device shown at *F*, and also through cable *q* to the call buttons on the various floors; and from the junction *G* through a flexible cable *H* to the push buttons in the car. If the car is started from any floor, and it is desired that it stop, say, at the second floor, then the button marked second floor is pressed, and the car is set in motion and automatically comes to a stop at the second floor. If the call button at the second floor is depressed, the car will run up to that landing if below it, and will descend if above it. The object of the device *F* is to render it possible to accomplish these results without resorting to complicated circuit connections and a multiplicity of switches. It will be seen that *F* appears to consist of a short screw of large diameter with springs rubbing on the top of the thread. In reality it is a cylinder made of material that is an electrical insulator, and the thread is made of metallic strips which, through their connection with the springs that bear upon them, make the proper electrical connections with the call buttons, the car buttons and the switches in the magnet box. The shaft *i* carries at its left-hand end a worm gear which is driven by a screw *m*, the latter being rotated by the movement of a chain *n* connected with the crosshead of the hydraulic cylinder. As will be seen at once, the motion of shaft *i* is made to correspond with that of the piston *A*, and therefore with that of the elevator car.

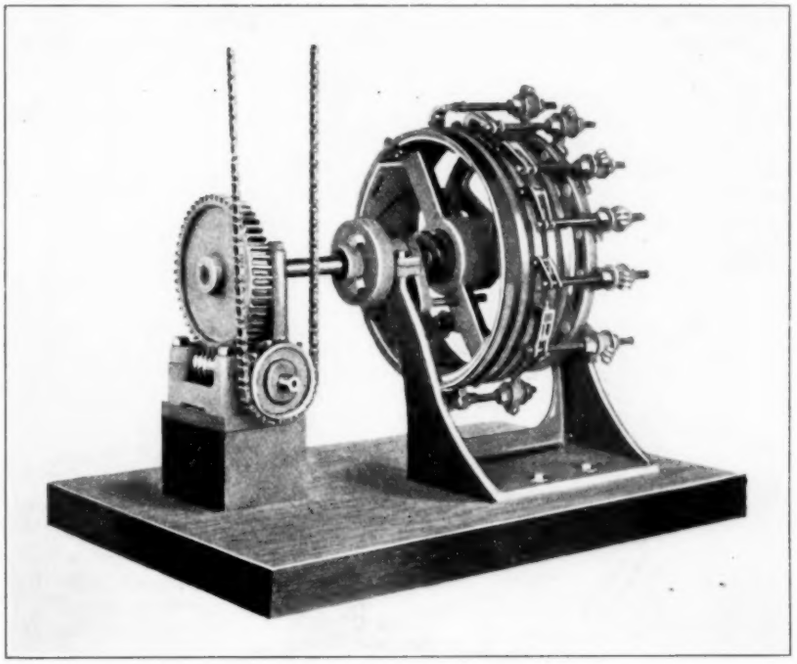


FIG. 2. FLOOR CONTROLLER.

The metallic strips wound upon the cylinder form a screw thread, but the strip is not continuous from one end of the thread to the other. At the center point there is a gap which divides the strip into two parts, which are connected with opposite sides of the circuit. The cylinder *F* is not directly attached to shaft *i*, but is mounted upon a stationary screw, which is of the same pitch as the thread formed by the strips fastened to the periphery. A crank on the end of shaft *i* rotates the cylinder, and as the latter turns upon a screw, it will be seen that the contact shoes or springs remain all the time central with the thread, as the cylinder is traversed by the screw hub upon which it turns. When the elevator car is at the top or the bottom of the elevator well, the cylinder *F* will be rotated to either one of its extreme positions, and therefore all the contact shoes will be on one side of the central break, and thus all will be connected with the same side of the circuit. If the car is at the bottom of the elevator well, the contact shoe connecting with the first floor will be very near to the break at the center of the thread formed by the metallic strips, and the shoes back of it will be connected with the second, third, etc., floors. If the first floor button is pushed, the car will move upward, and cylinder *F* will rotate so as to bring the central break in the thread nearer to the first contact shoe. When the break comes directly under the shoe the circuit will be broken and the car will stop. If instead of moving the first floor button, the third or fourth one is moved, then the car will not stop at the first floor, but will continue to the floor from which it is started, and in that case the cylinder *F* will be rotated until all the contact shoes connecting with the

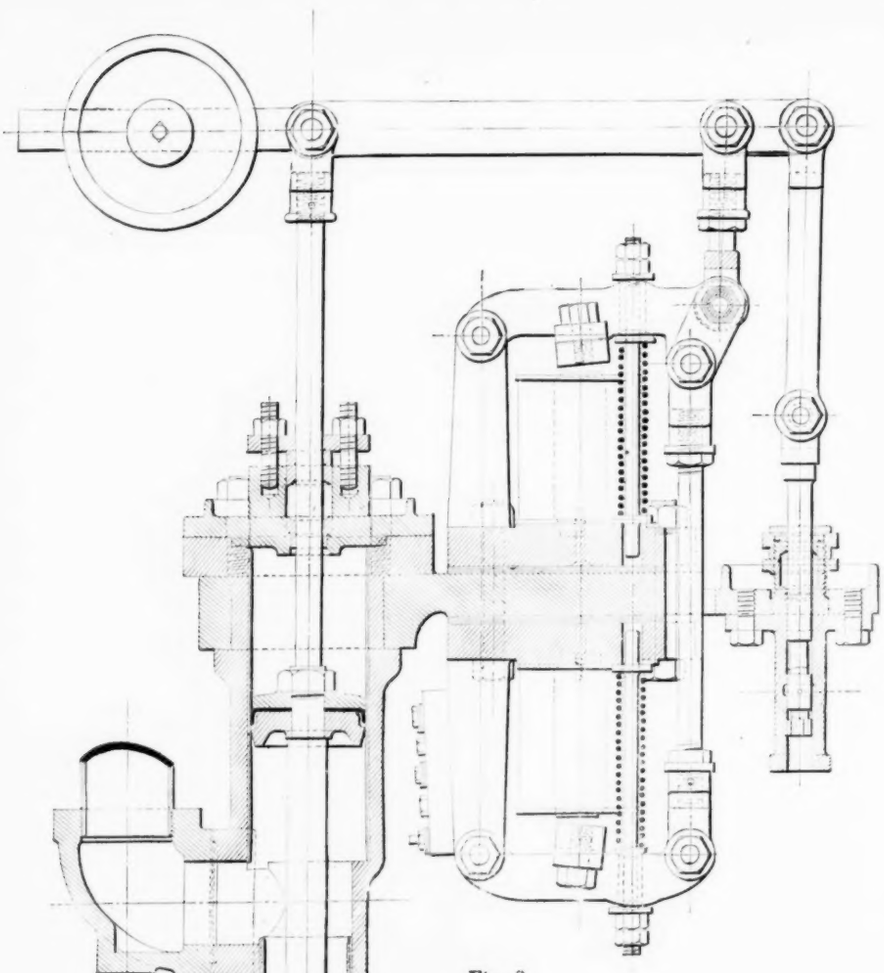


Fig. 3

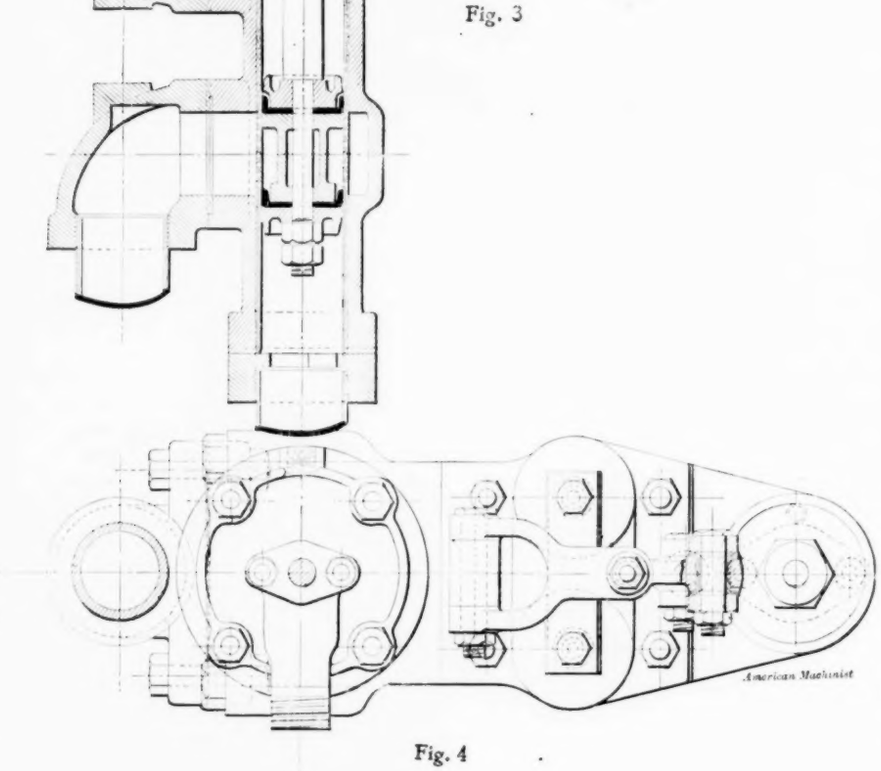


Fig. 4

PILOT VALVE AND OPERATING MAGNETS.

buttons on the floors below will rest upon the portion of the contact thread beyond the central break.

The actual construction of the cylinder *F* and its driving mechanism, which is called a floor controller, is well shown in the photographic illustration, Fig. 2. The construction of the cylinder, as well as the screw hub upon which it turns, and also the crank and sliding pin through which shaft *i* imparts a rotary motion, are all clearly defined.

The construction of the magnets that operate the pilot valve is shown in the enlarged detail drawings, Figs. 3 and 4, the first being a vertical elevation in section, and the last a plan with the upper lever removed. The chamber of the main and the differential valves is not the same in these drawings as in Fig. 1, but it will be seen at once that the difference is only in the shape of the outlets that connect with the lifting cylinder and the absence of the throttle valve *c*. The pilot valve and operating magnets are the same in both, however.

Fig. 5 shows another form of operating magnet in connection with a main valve chamber of the same design as that shown in Fig. 1. This figure also shows the piping for the pilot valve. The pipe connection from the upper end of the differential valve chamber to the pilot valve cannot be seen as it runs back of the bed plate that holds the magnets. The loop of piping contains two strainers, arranged with three-way valves at top and bottom, so that while one strainer is in use, the other one can be removed and cleaned. It is necessary to run the water that passes to the pilot valve through a strainer, for if not, small chips or other particles would get into the valve and interfere with its free movement.

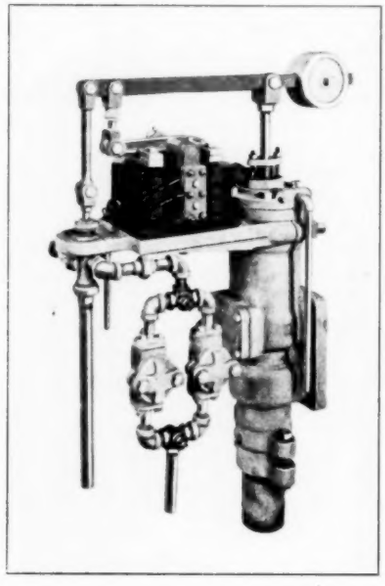


FIG. 5. ANOTHER FORM OF OPERATING MAGNET.

The Efficiency of Fans.

A short time ago we published an account of a new fan known as the "Sirrocco," abstracted from "The Engineer." The claims of efficiency made for the fan in that article have drawn out a voluminous correspondence on fan efficiencies, and the situation is summed up editorially as follows by our contemporary named:

"Some weeks ago we reported on the performance of a Davidson fan, employed in the much-needed work of ventilation at the Law Courts. What we said will be found in 'The Engineer' for April 12 last. The publication of the article in question was followed by the receipt of a somewhat voluminous correspondence, which has appeared week by week in our columns. As one writer has pertinently pointed out, this is the third or fourth discussion concerning the merits and demerits of fans that has appeared in our pages. These appear to be invariably barren of results; and the object of this article is to set forth why, in our opinion, these discussions arise, and why, in the main, they lead to nothing. To us the explanation appears very simple. People dispute about fan efficiency without having arrived at any uniform standard by which to measure it. If each of our correspondents used a rule of a different length to settle the diameter, width and dimensions in general of a fan they would naturally arrive at different conclusions. The efficiency of fans is measured by different standards of comparison, and the result is, in its way, just as misleading as would be the use of rules as we have indicated which did not agree as to the length of an inch and a foot. So far as we are aware, there is nothing new in all this; it has always been so, within our experience. Mathematicians have dealt very fully with the theory of fans; but neither the maker nor the purchaser cares in the least for what the mathematician has to say, and this simply because the rules of construction laid down by the mathematician cannot be applied in practice, or, being applied, do not produce the results foretold. Air has, indeed, an unfortunate predilection for doing that which was not anticipated; and there is excellent reason to believe that the best proportions for fans of all kinds have been ascertained by a tedious process of trial and error, and are the embodiment of pure empiricism rather than the result of mathematical deduction. In a word, mathematics will not help us at all in arriving at a decision on the merits and demerits of any particular type of fan. Nothing, in short, will take the place of actual results obtained in practice. That is to say, it is useless to assert that a fan is theoretically wrong, while the maker has more orders on his books for it than he can satisfy; or that a fan is theoretically right, while it is being discarded after trial by various users.

"In trying to arrive at some standard of efficiency, it is perhaps well to reject the mode of estimation which goes no further than an expression of satisfaction with a result. A certain colliery, for example, is supplied with a new fan. The result is excellent ventilation. Everyone is pleased. The fan was supplied to move a given number of cubic feet of air in an hour, and it does this and a good deal more. Nothing, however is said about the cost in power. Our correspondents are not, and very properly are not, content with such definitions of efficiency at this. The main point, though not the only point, at issue appears to be the horse-power required to perform a given amount of work. So far they agree. But the moment an attempt is made to measure or define the work, issue is joined. Far be it from us to side with any one of several parties to this dispute. Our purpose is to direct attention to facts which are overlooked by our correspondents. Thus, one standard is the number of cubic feet of air moved at a given velocity per unit of time. Apparently this is very simple. We have a pound or a ton of air moving at a given speed. It has acquired that speed from the fan. The energy or *vis viva* stored in the moving air represents so much work done in a unit of time. This is easily reduced to terms of horse-power. The engine driving the fan is indicated. A rule-of-three sum gives us the percentage of the whole power exerted in moving the air, and, consequently, the efficiency of the fan. All this seems plain enough, but it is quite misleading, or, at all events, the method may lead to endless discussion. At the very outset we are met by the question, What is the velocity of the air? or, to be more precise, of its many velocities which are we to select? Any figures will do to illustrate our meaning. A given fan is delivering air with a velocity measured at the throat of an *evasee* chimney of 50 feet per second. The stored work in every pound of the air is $\frac{50 \times 50}{64.4} = 38.3$ foot-pounds. So far so well. But now, instead of measuring the velocity at the throat of the chimney, let us measure it at the mouth, where the sectional area is double that at the throat. Here the air is moving at 25 feet per second, and the stored energy in each pound of air is only 9.575 foot-pounds per pound, or one-fourth of the former quantity. What has become of the difference? Nothing is more easy than to say that it has disappeared in effecting the expansion of the air. Inasmuch, however, as the air is, according to all authorities, more dense at the mouth of the chimney than it is at the throat, this explanation is, to say the least, open to objections. Be the dissipation of energy due to what cause soever we think good to assign it, the fact still remains that no one has ever actually measured the forces causing the waste, nor, indeed, does it seem to be possible to measure them. If what we have written has been understood, it will be seen that to estimate the efficiency of a fan by the velocity of the air in a tube may introduce gigantic errors. Aware of this, some persons would take the velocity of the air at the tips of the fan blades. We do not hesitate to say that it is impossible to ascertain the velocity of air at this point all round the fan with accuracy. Others take the velocity in a given drift or air way in a mine. But it will readily be understood, we think, that this method may be thoroughly misleading. The fact on which we wish to insist is that any error introduced by mistaking the velocity of the air, or by measuring that velocity in the wrong place, varies in amount, not as the velocity, but as the square of the velocity. To make this yet clearer, it may perhaps suffice to say that if a given velocity represents 100 indicated horse-power, one-half that velocity represents but 25 indicated horse-power, and so on. But there is another factor to be considered, to which sufficient importance is not, as a rule, attached. Fans have not only to deliver air, but they have to inhale it, and not infrequently this has to be done through tortuous passages, involving the formation of eddies and other absorbers of energy. It is almost impossible to estimate the work which may be lost in this way, the general result being a reduction in the volume or weight of air delivered.

"Considerations of this kind establish a doubt as to whether the proper measure of fan efficiency is the weight of air moved per minute and its velocity. Not that the standard is in itself wrong, but that it is extremely difficult to apply it fairly when a comparison is being drawn between two fans. A given fan may be discarded, and first one fan which we shall call A, and then another which we shall call B, is tried. The first doubles the weight of air delivered per minute, the velocity of the air remaining the same. An effect easily produced, say, merely by enlarging various dimensions. The fan B also doubles the quantity of air delivered, but it does so by doubling the velocity of the air. The power required to work A will be double, let us say, that used by the discarded fan, while that used by B will actually be eight times as much. How misleading velocity may be is very clearly seen, we think, from this example. Furthermore, it must not be forgotten that to estimate the efficiency of a fan in terms of the velocity of the air moved and its weight is a somewhat recondite method of going to work. Indicator cards cannot tell us anything of the power stored in the moving air. Probably the most satisfactory method of arriving at a just appreciation of the value of two types of fan is simply to take the actual volume of air transferred from one place to another per minute, without regard to its velocity, and then to ascertain the torque or angular resistance of the fan. It is clear that a

fan can do work without any transfer of air whatever, and that the air even in a closed fan case will offer more or less resistance to the rotation of the blades. After all, the true measure of the work done is the resistance which the air offers to the rotation of the fan blades. It is in overcoming this resistance that power is expended. That energy is stored up in the air is purely an incident—an accidental and inconvenient concatenation of cause and effect in which no one is interested, since all the stored energy in the air is wasted. A fan is not used to accumulate energy in air, but only to move air from one place to another. The work done by a locomotive is not determined in terms of the momentum of the train, but of the speed and the load on the drawbar. This brings us down to the exceedingly simple statement that, other things being equal, that fan is the best which moves a given volume of air per minute, out of, say, a coal mine or a building, with the lowest average pressure on the piston. We need not, we think, stop to explain that if the torque of the fan pulley and the belt speed in feet per minute are known, nothing is easier than to determine the precise horse-power expended by the fan. The measurement with accuracy of the volume of air moved is much more difficult; but we venture to think that it is not beyond the resources of science."

Associated Technical Clubs.

"The Engineer," of Cleveland, Ohio, following our recent editorial in advocacy of a Union Engineering Society House for New York, tells as follows how the local technical societies of Cleveland have found mutual satisfaction in co-operation:

"Until two years ago Cleveland's several engineering clubs struggled along precariously in the endeavor to maintain separate headquarters suitable for professional and social purposes. Only one of the four was able to pay for quarters that decently met the demands of an engineering club. Finally, however, a few members of the Civil Engineers' Club, the Electric Club, the Architectural Club and the Chemical Club advocated the joining of forces in order to secure rooms adequate to the necessities of live engineering organizations and consistent with their character. They worked with zeal, and as a result of their indefatigable efforts the Associated Technical Clubs were organized embracing the four clubs named. These clubs have for two years occupied the rooms in common, their libraries being consolidated, without the least friction, and the plan is considered a great success. Each club retains its organization and autonomy. The headquarters are managed by a house committee on which each is represented. The arrangement of dates for holding meetings is made in such a way as to cause no conflict. All members have a right to attend the meetings of the constituent clubs, with the privilege of the floor. The results have been better than the most enthusiastic unionists hoped for, and the usefulness of each club has been vastly increased. Attendance at meetings is a hundred per cent. better, the rooms are now an engineering center, and, in fact, the several obstacles that seemed insurmountable to the separate clubs have been solved satisfactorily in this manner. The constituent clubs of the Associated Technical Clubs of Cleveland are, of course, local, and very small compared with such large and wealthy bodies as the American Society of Mechanical Engineers, but we would suggest that an investigation of their experience for the past two years be made before a house devoted entirely to and maintained by the society be secured, continuing on a larger scale the defects of the present establishment. Though the example cited is comparable only in principle, we think there is little doubt that the plan will work out as favorably with large societies as with clubs of moderate size."

Letters from Practical Men

Circumferential and Metric Steel Tapes—Paper Scales.

Editor American Machinist:

I note on page 956 that a steel tape having standard graduations on one side and circumference measures on the other would be a handy thing. I wished for just that thing myself a few years ago, but, having a pocket tape with metric divisions on one side, I discovered that 95.8 centimeters is the circumference of a 12-inch circle within .02 inch, so, roughly speaking, 8 centimeters = circumference of 1 inch, and this makes easy calculation for diameters in sixteenths of an inch. While this new use should not delay the production of the tapes you mention, it may be handy to know for those having metric tapes.

Speaking of drafting scales, paper ones have been advocated and are valuable for certain uses. For a drawing that must be worked on a long time, as in getting up a design for a complicated machine, the drawing will be found of various sizes dependent on the humidity of the air, and one good plan to avoid trouble is to cut one strip of the same paper lengthwise and another crosswise of the sheet, graduate them with the principal unit divisions and use them as scales for all long distances in their respective directions. Always have these scales lying on the drawing, so that they may undergo the same changes as the drawing itself, and *by no means varnish* or otherwise change their texture from that of the drawing. I have been able to get quite satisfactory work in this way when the actual distances would be found to vary at times as much as 1/8 inch in 3 feet. C. S. BEACH.

Bennington, Vt.

Outfits for Shop Accidents.

Editor American Machinist:

I notice in the "American Machinist," No. 32, an inquiry for emergency outfits for shop accidents, and I would suggest the method adopted, or rather permitted, by the Fairbanks Scale Company. They allow one of the local druggists to furnish a suitable cabinet and keep it supplied at his own expense with a few simple remedies, and in return for this he is permitted to have his business card prominently displayed on the outfit. The case contains absorbent cotton, a few rolls of bandages of different widths, adhesive plaster, particularly of the waterproof kinds, a considerable quantity of baking soda for burns, a bottle of arnica, another of Pond's extract and a few other specialties which the druggist may recommend for trial. No stimulants are allowed. The case also contains a sharp knife and a pair of shears, the latter being attached to the case by a string, so as to be at hand when wanted. A stretcher is furnished by the corporation, but no surgeon is regularly employed, since a hospital is located just opposite the factory entrance, and it is only intended to extend such aid to the injured man as to relieve him until the doctor arrives. There are frequently one or more young fellows about the works who are studying medicine in their spare hours and who are competent to attend minor cases or check any dangerous flow of blood. It is impossible to determine whether these simple remedies have saved any lives, but I believe it to be a fact that no employee ever died from injuries received about the works, although this company has been in business about seventy years and now employs about 800 men. W. H. SARGENT.

St. Johnsbury, Vt.

Cutting Up Drawing Paper.

Editor American Machinist:

The following is a description of a paper cutting device which I added to a shallow chest of drawers:

Fig. 1 shows a plan of the top, and Fig. 2 a section of the box which holds the roll of paper. A strip of hard-rolled brass *A* was let into the top of the drawers for a cutting plate and another strip *B*, with a straight edge, screwed to the hinged top of the box as a guide for the cutter.

The standard sizes of paper used are 30x22, 20x15, 12x10 and 8x5 inches. A roll of paper 30 inches wide is therefore most convenient. The top of the chest was ruled with lines, as shown. To cut the 8x5 size, the paper is unrolled a little and the lid closed to give friction and keep the paper taut. The end is put true with the line marked 8 and a strip cut off with a roller glass cutter. This strip is rolled up and partly inserted in the box and the edges adjusted to coincide with the rectangle marked 8x5 and cut off. This process is repeated five times on each

strip of this size. In the same way the larger sizes are cut without any waste.

This method works very well and is quick and accurate and the edges true and smart. The cutter has a movable

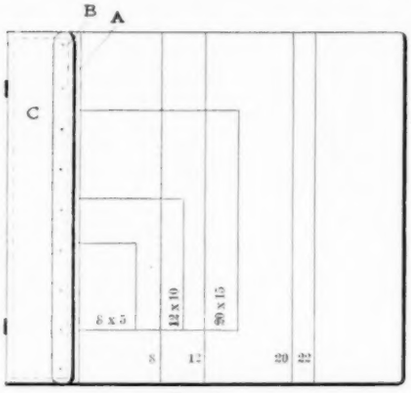


Fig. 1

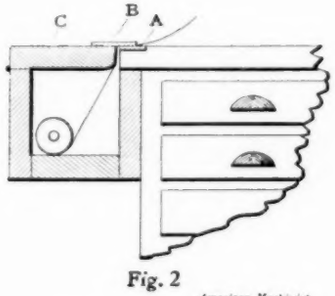


Fig. 2

American Machinist

CUTTING UP DRAWING PAPER.

spindle, so that the wheel can be sharpened when necessary.

Hoby, England. CHAS. B. TAYLOR.

Thickness of Plates Encastré.

Editor American Machinist:

It seems highly desirable to point out that the method pursued in the article published in your issue No. 30 leads to results for circular, square and rectangular plates which differ essentially from those which have been obtained by Grashof and others by regular methods of analysis. As given in Unwin's "Machine Design" (1901 edition), using the same notation as in the article named, I find that for circular plates $T = \frac{Pd^2}{6t^2}$ instead of $\frac{Pd^2}{8t^2}$ as in the article named.

Again for square plates

$$T = \frac{Pm^2}{4t^2} \text{ instead of } T = \frac{Pm^2}{8t^2}$$

as in article, and for rectangular plate p'' long by v'' wide

$$T = \tfrac{1}{2} \times \frac{p^4}{v^4 - p^4} \times \frac{v^2}{t^2} \times P \text{ against } T = \frac{Pp^2v^2}{8t^2}$$

These differences require explanation.

It is of course quite possible that the older authorities quoted may be incorrect and the fact that the rules given in the article have stood the test of practice may be looked upon by some as sufficient warrant for their use. At the same time I cannot help feeling that much must depend upon the values that have been assigned to T in applying the rule. Thus such values may have been used for T that though twice the intended stress may have been borne by the material, yet no harm may have resulted after many years' use of the rules.

One method of viewing the method pursued certainly suggests that there is room for further reflection. The case of the circular plate may be instanced. Here the plate is considered to be made up of a number of elementary sectors, each of which is treated as a beam of the shape ABC in plan (see Fig. 2), the shape assumed by such a beam when loaded would be as shown. It is evident, however, that the shape actually assumed under load would be somewhat as in Fig. 1. The difference is vital.

It would be of value if the contributor would state what values for T he has been in the habit of using when applying the rules he advocates.

ROBERT A. BRUCE.

New Brompton, England.

[Personally we have little faith in any analysis of this subject that we have seen,

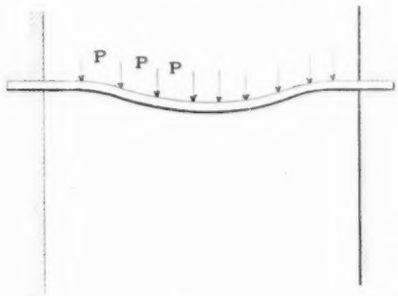


Fig. 1

Form assumed by plate

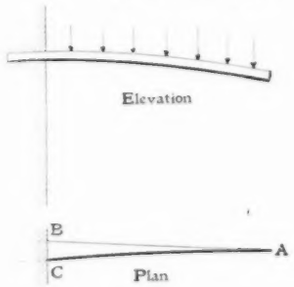


Fig. 2

Form assumed by triangular beam

American Machinist

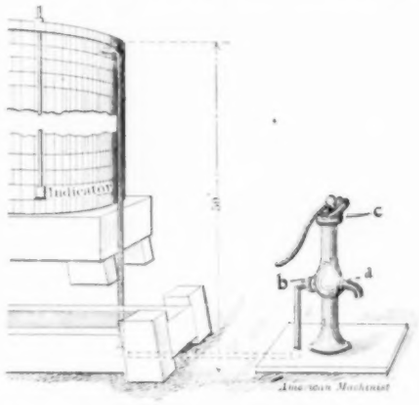
THICKNESS OF PLATES ENCASTRE.

as they all involve inadmissible assumptions. The fact that Mr. Barrett's formula had been widely and successfully used was the consideration that led us to publish it. We agree with Mr. Bruce that it would be highly desirable for Mr. Barrett to give the stresses which he has inserted in the formula when making use of it. This subject is one which needs experimental investigation. Experience is a good guide, but experiment is often a much better one.—Ed.]

An Automatic Toll Collector.

Editor American Machinist:

At a seashore resort I recently ran across a drink-dispensing arrangement



A TOLL-COLLECTING PUMP.

that is far ahead of the slot-machine. This device makes automatic collections, with no bother to the proprietors, and they do not even have to walk around and gather in the shekels. The pump, an iron force pump, innocent looking enough, was arranged as shown in the sketch and was the only one in sight.

I was dry, and espying the pump, was surprised to notice a brand-new tin cup invitingly placed; but in taking my turn I saw through the whole game. You get your drink, but the proprietor keeps his tank full without expense or trouble. In sketch *a* is a valve throttled and its handle removed, *b* is a check, *c* is the tin cup. Notice float indicator at the bottom of tank. FRANK RATTEK.

Drill Speeds and Feeds.

Editor American Machinist:

The letter from A. Driller, on pages 950-1, is of special interest to us at the present time, as we have lately added to our manufactures a line of radial drills provided with sixteen spindle speeds and eight rates of feed. Your correspondent is right theoretically, when he says that to get the best results a drilling machine should be provided with as many spindle speeds as there are drill diameters. He will, however, admit that where a large range of diameters is a desideratum the great number of speeds then necessary would make the cost of the machine prohibitive. The problem becomes, not how many speeds we ought to have, but, what is the least number that we can get along with and still have an efficient machine?

An important point in this connection, and one that your correspondent did not touch upon, is the bearing that speed has upon the possible rate of feed, the maximum feed being obtainable only when

the drill is running at the correct speed, another good reason for having a large number of speeds.

As long ago as 1899 we fitted our No. 1 radial drill with sixteen speeds, and the machine of this type that we exhibited at the Paris Exposition attracted considerable attention on that account. At the current Exposition at Buffalo we exhibit our latest radial drill; this has sixteen speeds and eight feeds. The accompanying tables give our two standard speed ranges. We supply the machine fitted with the range best suited to our customers' requirements. The tables speak for themselves, showing clearly that with sixteen speeds a very close approximation to theoretically correct cutting speeds is obtained for both ranges.

TABLES OF SPEEDS OF BICKFORD DRILLS COMPARED WITH THE MORSE STANDARDS.

The Morse T. D. & Mach. Co.		Dia. of Drill.	The Bickford D. & T. Co.	
Revolutions per Min.	Feet per Min.		Revolutions per Min.	Feet per Min.
267	34.95	½	270	35.34
238	35.03	9/16	236	34.74
214	35.01	5/8	212	34.68
194	34.92	11/16	188	33.84
168	32.98	¾	173	33.96
155	32.97	13/16	153	32.54
144	32.98	7/8	136	31.14
134	32.83	15/16	120	29.41
115	30.11	1	111	29.06
102	30.04	1⅛	98	28.86
89	29.12	1¼	87	28.47
77	28.98	1 7/16	77	28.98
71	29.04	1 9/16	71	29.04
63	27.83	1 11/16	63	27.83
55	26.40	1⅞	56	26.88
. . .	. . .	2⅛	47	26.13

The Morse T. D. & Mach. Co.		Dia. of Drill.	The Bickford D. & T. Co.	
Revolutions per Min.	Feet per Min.		Revolutions per Min.	Feet per Min.
267	34.95	½	267.37	35.00
238	35.03	9/16	221.84	32.68
194	34.92	11/16	184.42	33.20
155	32.97	13/16	153.07	32.56
134	32.83	15/16	127.84	31.32
102	30.04	1⅛	106.10	31.24
89	29.13	1¼	88.20	28.86
74	29.01	1½	73.21	28 75
61	27.94	1¾	61.23	28.04
51	26.70	2	50.78	26.59
. . .	. . .	2¼	42.19	24.85
. . .	. . .	2½	35.02	22.92
. . .	. . .	2¾	29.28	21.08
. . .	. . .	3	24.29	19.08
. . .	. . .	3⅜	20.17	17.82
. . .	. . .	3¾	16.77	16.46

In making a choice of speed and feed ranges it is necessary to bear in mind that a drilling machine, whether plain vertical or radial, is frequently called upon to perform several operations besides ordinary drilling, as, for example, tapping, reaming, counterboring with three lipped chucking drills, and boring with single-end and double-end cutters, and that, especially with boring, slow speeds at quick feeds are essential to maximum output. Any attempt, however, to make one range of speeds cover very small drilled holes as well as large bored holes results either in an altogether too expensive amount of gearing or such big jumps between the successive steps of the range as to materially decrease the output of average work. In other words, the range of any drilling machine, so far as speeds are concerned, must be suited to that of the average work to be done.

Bickford Drill & Tool Co.

A Peculiar Accident with an Air Hoist.

Editor American Machinist:

A rather remarkable accident occurred in connection with an air hoist at our works yesterday morning. It will doubtless interest your readers, and may possibly lead to precautions to prevent similar occurrences in other places. The air hoist was 6 inches diameter by 4-foot lift, and served a flanging machine. For some days past it had shown a disposition to run down when not loaded. At the time of the accident two men were making some repairs on the machine, and the hook of the hoist descended until it rested on a lug of the chuck, and then the cylinder of the hoist rose far enough to lift the ⅞-inch S-hook out of the closed link above, and then the whole hoist dropped between the two men, grazing one and slightly scratching the other, but not otherwise injuring either. I was standing nearby and believed that the S-hook had straightened or broken; but found it intact. As this hook must have been lifted at least 2½ inches to come out of the link above, I at once thought of Prof. Sweet's query of why crane hooks are made so deep inside, when a 1⅜-inch flange will hold a locomotive on the track. I guess the answer would be that the load doesn't always rest on the hook while it is being manipulated, and that it is best to have a hook that will not disengage when the chain is slack.

But I am digressing. To be frank, I would not have believed such an accident possible if I did not know all the circumstances to be exactly as stated. The S-hook had been forged under my direction and I had put it in place myself, besides helping to hang the hoist to it. The hoist had never been moved since, and could not have fallen without first rising sufficiently to disengage the S-hook.

The hoist was of a type in which the lowering is done by exhaust pressure, and I judge it probable that a slight leakage of the leathers had admitted air above the piston, the unbalanced pressure on the upper head due to the area of the piston rod being sufficient to lift the whole machine when the hook at the bottom of the piston rod rested against a solid object like the lug on the chuck.

The moral which I draw from the accident is: "Don't hang air hoists from open hooks." When this one goes up again it will be hung from a C-hook with the open side of the "C" closed by a plate drilled to receive the threaded ends of the "C" and held on by nuts. And the nuts will be held on by riveting the threads over.

L. O. Danse.

Detroit.

A Modification of the Shaper Clutch —A Possible Cause of Trouble With all Friction Clutches.

Editor American Machinist:

Mr. F. H. Buckingham, in No. 29, page 813, tells of his trouble with a shaper clutch and his cure for it. I once had a great deal of trouble with the clutch. We, at the time, had no other way of planing, so we had to use the shaper. As long as we held the reverse lever hard, the shaper would run. That was very tiresome. We had no chance to visit. I wrote the makers and received a very courteous letter from them. They advised putting on a stop to hold the lever over. This helped, but did not cure the trouble entirely. The machine would run as long as one stood by it, but the minute he went to see his neighbor the pesky thing would stop, and the Old Man was sure to happen along just at that time. You know how that goes.

The pulleys and shaft were worn considerably. After studying the matter I concluded that the pull of the belt on the pulley the clutch was in acted the same as when you want to separate two pieces of stove pipe by bending it this way and that over something. I took a good cut off the shaft, bored and bushed the pulleys to fit, but did not bush the double male cone, reasoning that, it being loose on the shaft, the pull of the belt would not pull it loose. We have had no trouble since. The size of cut is limited only by the amount the belt will pull. I think if the Hendey Machine Company would follow this suggestion its clutches would run longer without giving trouble.

W. A. Bright.

Decatur, Ill.

[As has been previously explained, the Hendey Machine Company has no trouble with the clutch as now and for some time past made, but Mr. Bright's remedy is worth noting, for it very possibly indicates a source of trouble entirely overlooked where one member of the clutch running loose on the shaft is driven either by a belt or by gear wheels. An obvious remedy would be to make the female piece separate from the pulley or gear wheel and connect them by some sort of balanced driver which would allow things to adjust themselves and drive without being forced apart by the action spoken of; which obviously must begin to take place as soon as any appreciable looseness develops.—Ed.]

2		2¼		2½		2¾		3		3¼		4		5		6		7		8		9		10		11		12		14	16	18	20	22	24	26	28	30	32	36	40	48
Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.	Divs.
6	71	5	146	5	7	4	142	4	47	3	148	3	35	2	128	2	24	1	120	1	143	1	99	1	64	1	36	1	12	221	196	175	157	143	131	121	112	105	98	87	79	65
6	142	5	42	5	14	4	34	4	94	3	46	3	70	2	6	2	48	1	148	1	86	1	198	1	128	1	72	1	24	198	142	100	64	35	12	212	224	216	196	174	158	180
6	213	5	188	5	21	4	176	4	141	3	194	3	105	2	134	2	72	1	97	1	179	1	47	1	192	1	108	1	36	172	88	25	221	179	143	113	86	65	44	11	237	195
6	34	5	84	5	28	4	68	4	188	3	92	3	140	2	12	2	96	1	46	1	72	1	146	1	6	1	144	1	48	146	84	200	128	72	24	234	198	170	142	98	66	10
6	105	5	230	5	35	4	210	4	235	3	240	3	175	2	140	2	120	1	245	1	215	1	215	1	70	1	180	1	60	120	230	125	55	215	155	105	60	25	240	185	145	75
6	176	5	126	5	42	4	102	4	32	3	138	3	210	2	18	2	144	1	194	1	108	1	94	1	180	1	216	1	72	94	176	50	192	108	36	236	172	130	88	22	224	140
6	247	5	22	5	49	4	244	4	79	3	36	3	245	2	146	2	168	1	143	1	1	1	193	1	198	1	2	1	84	68	122	225	90	1	167	97	34	225	186	103	58	205
6	68	5	168	5	56	4	136	4	130	3	184	3	80	2	24	2	192	1	92	1	144	1	42	1	12	1	38	1	96	42	68	150	6	144	48	218	146	99	34	196	132	20
6	139	5	64	5	63	4	98	4	173	3	82	3	65	2	192	2	216	1	41	1	87	1	141	1	76	1	74	1	108	16	14	75	193	37	179	89	8	195	132	83	211	85
6	210	5	210	5	70	4	170	4	220	3	230	3	100	2	30	2	240	1	240	1	180	1	240	1	140	1	110	1	120	240	210	250	70	180	60	210	180	50	230	120	40	150

Diametral Pitch.

2″		1⅞″		1¾″		1⅝″		1½″		1 15/16″		1⅜″		1 5/16″		1¼″		1 3/16″		1⅛″		1 1/16″		1″		15/16″		⅞″		13/16″		¾″		11/16″		⅝″		9/16″		½″		7/16″		⅜″		5/16″		¼″		3/16″		⅛″		1/16″	
Turns	Turns	Divs.	Turns	Divs.	Turns	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Turns	Divs.	Turns	Divs.	Turns	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.	Turns	Divs.
8	7	125	7	6	125	6	5	187	5	125	5	62	5	4	187	4	125	4	62	4	3	187	3	125	3	62	3	2	187	3	125	2	62	2	1	187	1	125	1	62	1	187	125	62								
	7	250	7	6	250		5	125	5	250	5	125		4	125	4	250	4	125		3	125	3	250	3	125		2	125	2	250	2	125		1	125	1	250	1	125		125	250	125							
	7	125		6	125		5	63	5	125	5	187		4	62	4	125	4	187		3	62	3	125	3	187		2	62	2	125	2	187		1	62	1	125	1	187		62	125	187							
	7	250		6	250		5	250	5	250	5	250		4	250	4	250	4	250		3	250	3	250	3	250		2	250	2	250	2	250		1	250	1	250	1	250		250	250	250							
	7	125		6	125		5	187	5	125	5	62		4	187	4	125	4	62		3	187	3	125	3	62		2	187	2	125	2	62		1	187	1	125	1	62		187	125	62							
	7	250		6	250		5	125	5	250	5	125		4	125	4	250	4	125		3	125	3	250	3	125		2	125	2	250	2	125		1	125	1	250	1	125		125	250	125							
	7	125		6	125		5	63	5	125	5	187		4	62	4	125	4	187		3	62	3	125	3	187		2	62	2	125	2	187		1	62	1	125	1	187		62	125	187							
	7	250		6	250		5	250	5	250	5	250		4	250	4	250	4	250		3	250	3	250	3	250		2	250	2	250	2	250		1	250	1	250	1	250		250	250	250							
	7	125		6	125		5	187	5	125	5	62		4	187	4	125	4	62		3	187	3	125	3	62		2	187	2	125	2	62		1	187	1	125	1	62		187	125	62							
	7	250		6	250		5	125	5	250	5	125		4	125	4	250	4	125		3	125	3	250	3	125		2	125	2	250	2	125		1	125	1	250	1	125		125	250	125							

Circular Pitch.

American Machinist

SPACING TABLE FOR RACK CUTTING ON THE CINCINNATI SHAPER.

Pitch of screw, ¼ inch. Dial has 250 divisions, each of which equals one-thousandth of an inch. In the table the column headed "Turns" gives the number of whole turns, and the column headed "Divs." gives the number of divisions of the dial in addition.

Spacing the Teeth of a Rack.

Editor American Machinist:

We note with interest in the "American Machinist" No. 33 an article describing a method of spacing for cutting racks upon a shaper. It may also be of interest to describe a method which we have found to be very satisfactory, and we enclose a blueprint of a table of settings for any pitch, diametral or circular.

As all of our shapers have a graduated collar upon the cross-feed screw of the rail, as well as upon the screw of the tool slide, settings to the .001 inch can be readily obtained. The table is arranged for continuous reading of the dial and is used as follows:

Take, for example, a rack of 10 pitch. Reference to the table shows under 10 the settings used. The dial is to be set at zero when cutting the first space and for the next space the screw is given one complete turn and on to the 64th division of the dial. For the next space the screw is given one complete turn and on to the 128th division; for the next, one turn and on the 192d division, and so on. This method necessitates the re-setting of the

dial for every 10 spaces, which is as far as the table goes; but there is no reason why readings cannot be extended indefinitely if desired. A copy of this table will be sent to anyone who desires the use of same. THE CINCINNATI SHAPER CO.,

P. G. MARCH, Pres.

Work for the Mandrel Press.

Editor American Machinist:

During the time that the articles on "Machine Tools" by Mr. John Richards were appearing in the "American Machinist" his mandrel driving machine, as illustrated in your issue of May 18, 1899, struck me as being a particularly handy machine to have about the machine shop.

I had one made much in the same way

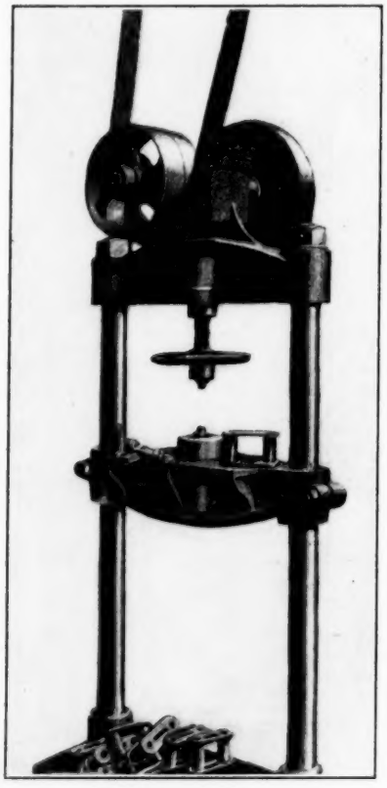


FIG. 1. THE PRESS.

as then described and as shown in photograph herewith. I find it to be a most useful little machine, doing its work well. It is arranged to take mandrels up to 4 inches diameter and runs at 185 revolutions with 3-16 inch stroke. Having so few parts it is inexpensive, not liable to get out of order and requires no attention.

An hydraulic mandrel press, on the contrary, has a considerable number of parts to be kept in order and requiring attention. There's the small pressure pump with its valves, leathers, and so forth, and very often it is just those parts which give trouble and cause annoyance all round, especially when (as is most often the case) the mandrel press is everyone's help, but nobody's care. With the hydraulic machine, too, there is a greater risk of bursting the job should the mandrel be tight, for the workman really doesn't know and seldom appreciates what pressure he is putting on, and may continue to drive with the full pressure as set by the relief valve, until something goes.

Not so with a machine of the type illustrated in photograph. The weight of each blow is felt by the workman and little experience is required to be able to know when the blow is excessive. And should the blow become excessive (for it can be graduated from little to much by the amount the hand-wheel is turned) the table will relieve the work by springing under the weight of the blow, or, as sometimes happens, it will be forced down the legs, step by step; for, as will be noticed, the table is held in position by friction only.

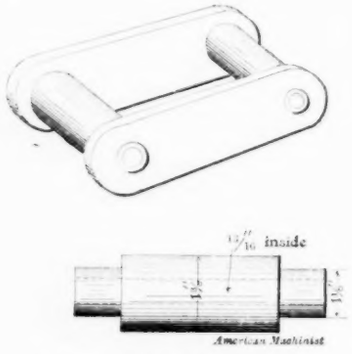


FIG. 2. A LINK AND THE RIVET.

While the machine was made expressly for driving mandrels I find it can do many other jobs equally well where a series of light rapid blows are required, and the photograph shows it engaged on one job in particular which often comes our way and on which it will work for weeks at a time. The job is in connection with a heavy ore-conveying belt made up of links as shown in sketch Fig. 2. These links are formed of two side bars with tubular end pieces, the ends of tubes being expanded in the eye of side bar to hold all secure, and we expand these ends on the mandrel machine. When making the machine I made the end of the ram with a removable face so that other work could be done when required.

The sketch Fig. 3 will explain the means adopted in expanding the ends of these links, and needs no further description. It makes a good job and a thoroughly tight one. Had there been a parcel post service between this and the "States" I should have sent you a link sawn through to enable you to see just how nice a job it makes.

From time to time I have recived many valuable suggestions from the pages of the "American Machinist," and I hope the foregoing description of this link job done on Mr. Richards' machine may be of interest to some of your readers.

Warrington, Eng. C. P. T.

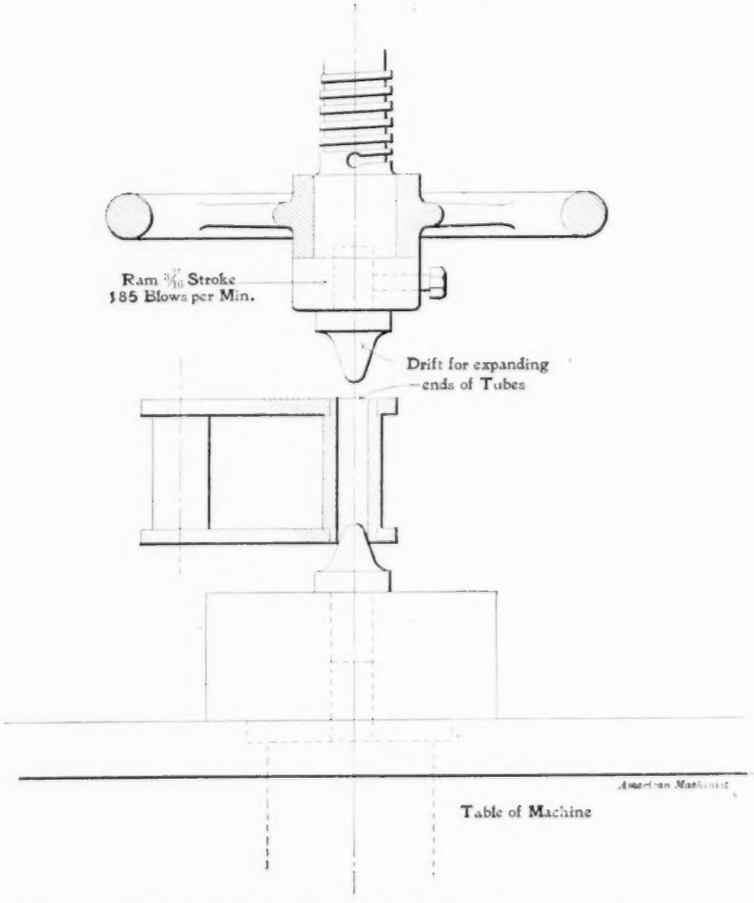


FIG. 3. APPLICATION OF MANDREL DRIVING MACHINE TO CHAIN MAKING.

The Accuracy of Lead Screws—Cutting a Rack.

Editor American Machinist:

The article on page 918, telling about cutting a rack, calls to my mind an incident that shook my faith in the permanent accuracy of lead screws. I had been having lots of trouble for some time in fitting up heads with some long 5/8-inch thumb-screws that had about 10 inches of thread. These screws had to be an easy finger fit, without shake, as the screw served also as a guide. The casting through which it was fitted had a threaded hole about 1½ inches long; half the screws were right-hand and half left-hand, the latter giving no trouble whatever. I ran a die over the right-hand ones, without doing any good; they would fit for a few inches and then stick, and when forced a few inches more they would work easy again. I laid a right and a left-hand screw together and held them to the light, and I saw at once that something was very much wrong. By laying a 12-inch scale on the screws I found that the left-hand screw came pretty fair with the graduations; but the threads on the right-hand screw were "'way off." As both screws were made on the same lathe this puzzled us for some time. We took out the lead screw and found that the threads were worn sharp for some distance. An 18-inch scale placed fair with one side of thread showed the threads at this place worn over 1-16 inch, while the other side showed very little wear. The explanation was that a great number of short thumb-screws were made on this lathe and threaded right-hand in the ordinary way with a tool, running the carriage back by hand. This confined the wear to a short space on the screw, and as the work was all on one side, the other side of the threads was not worn any. We changed the screw end for end, by welding on one end and cutting off the other, and had no further trouble. Since then I never gamble on results within a few thousandths of an inch when spacing distances with an old screw.

I would suggest that for cutting a rack, or for spacing any other measure on a shaper, the simplest arrangement would be a dial on the screw, graduated to read to thousandths. Its utility would not be confined to the cutting of racks, as I have used such an arrangement very frequently.

GEO. J. MEYER.

The Best Way to Make the Punch.

Editor American Machinist:

On page 973, Mr. Wilfrid J. Thompson takes me to task for making the punch and holder described on page 748 of a solid forging, and says that so doing adds unnecessarily to the cost of the work. He then shows a way which he says is better and cheaper. Now, in the first place, I am not convinced that this is so, and will leave it to anyone who is familiar with the punching of heavy stock which is required to be formed at the same time as to whether it is not more practical to construct the punch and holder of a solid piece, and also cheaper, than to get out a pad and fasten the punch within it, as described by Mr. Thompson. He says that in case of a corner breaking off the blanking punch the whole forging would be ruined. This is very true, if the corner broken off was of considerable size, but I may say that I have made a number of punches in the manner shown, and always for punching heavy stock, and have not as yet had a corner break off, as the punch has always been hardened, tempered, or left soft, as was best suited for the stock to be punched.

Now, in order to settle this question, we will consider the two methods of construction. In Mr. Thompson's method the work to be done is to finish the blanking punch, turn up and finish the cast iron holder, get out the stock for the punch pad, plane it up, work out the hole for the punch, drill and countersink the holes for the fastening screws, fasten the blanking punch within it, and then locate and finish the holes for the piercing punches.

For my punch the first cost is the forging, and where this is forged by a smith that knows his business and who is familiar with this class of work, the cost is insignificant. To finish the punch and holder, all that is necessary is to turn up the stem to fit the ram of the press, face off the back and punch face, solder the templet to the punch face, fasten it by the stem in the miller chuck, mill down all around to the edges of the templet, remove the templet, chamfer the edges of the punch and fit it to the die. Shear the punch face to the shape desired, locate and drill the hole for the pilot pin, harden and temper the punch, then locate and drill the holes for the piercing punches and fasten them with set-screws. Now, when the amount of time consumed in the attainment of these respective results is considered and compared with Mr. Thompson's methods, I think (leaving all question as to the strength and solidity of my method aside) that my punch can be finished in one-half the time which would be required to finish his.

One thing must be remembered: that the punch described by me was for punching ¼-inch thick cold-rolled stock, and the blanks punched were formed at the same time, hence the practical advantage of the punch and holder in one piece.

WILLIAM DORAN.

The Steel Tape for Circumferential Measuring.

Editor American Machinist:

Referring to an editorial note on page 956, in which you speak of the usefulness to the trade of a steel tape graduated with the principal divisions 3.1416 inches apart in such work as measuring wheels, rolls of large diameter and things of that character, I would say that the Keuffel & Esser Company, of 127 Fulton street, New York city is making a special tape to fill the need mentioned in your note. The tape is of steel, 12 feet long, and contained in a German silver case with stop and spring. One side of the tape is graduated in inches and sixteenths. The other side is divided into spaces 3.1416 inches in length and numbered 1, 2, 3, 4, 5, etc., the first space being further subdivided into sixty-four equal parts. Passing the tape about the periphery of the wheel or roll, the circumference is at once read off on one side of the tape and the diameter on the other. Other uses of the tape are evident, and from my own experience in its use, the statement of its value to the trade, made in the note above referred to, is none too strong. The price of this tape, $3.25, is anything but prohibitive, and the outlay for it would be one not to be regretted.

J. Y. WHEATLEY.

The Acceleration of Projectiles—Steel Restorers—A Tempering Trick.

Editor American Machinist:

On page 933 there is mentioned the fact that the velocity of the projectile at a distance of 10 feet from the muzzle is 64 feet more than at the muzzle. Is there an explanation for this? I have thought over it in this way: The gases after leaving the muzzle and expanding more freely, have a higher velocity than the projectile, and while still surrounding it they of course still push it. This would show that a longer barrel would have given the gases more time to speed up that ball, while the short barrel might have been preferred for other reasons. If I am not mistaken I have heard or read that with a sandblast it is the same way, the force of the sand at some distance away being stronger than right at the nozzle, and I cannot see why the barrel or mouthpiece should not be given the full length necessary to bring the sand to nearly the speed of the propelling air. I think I have made it clear that the matter is not clear to me, and I submit this in the hope of getting information.

The article about "Steel Sharps" in the same issue reminds me of a short-timed experience I had with a steel restorer six years ago in Germany. The stuff that he had looked a good deal like brown shellac and was applied this way: Heat the steel to a low heat, as for water anneal; dip it in this stuff for a few seconds, then heat and harden as usual. This restorer certainly did improve steel, not only when burned, but also when in good condition. I have treated cold chisels with it and instead of drawing a blue color cooled it off at a straw yellow. They cut better than any other I ever used. This stuff was made in Hanover, but I don't remember the firm.

The cutting of a tool is improved by drawing the color twice instead of once

and leaving the color a shade lighter than usual. When the color draws to the edge of the tool, don't cool the tool off altogether; cool the point only, then rub again with emery cloth and watch the color draw a second time, and then cool off as usual.

F. SCHURING.

Milwaukee.

National and State Civil Service Examinations.

The United States Civil Service Commission, Washington, D. C., announces that on October 8-9, 1901, an examination will be held in any city where postal free delivery has been established, for assistant (piece-work computer), in the Nautical Almanac Office. The examination will consist of algebra, geometry (synthetic and analytic), trigonometry (plane and spherical), logarithms, calculus, spherical astronomy and practical astronomical computations. Persons who desire to compete should at once apply to the Commission, for forms 304 and 375, which should be executed and forwarded to the Commission.

Competitive examinations will be held September 28 in twenty-four cities and towns of New York State to fill the following positions among others: Assistant industrial superintendent Auburn Prison, $780 to $900 per year and maintenance; assistant electrical engineer, state departments and institutions, $40 to $60 per month with maintenance in some cases; electrical engineer, state departments and institutions, $900 per year with maintenance in some cases. Applications must be filed in the office of the State Commission on or before noon of September 23. For further particulars and application blank, adddress Chief Examiner, State Civil Service Commission, Albany, N. Y.

Technical Publications.

"The Construction of a Gasoline Motor Vehicle." By C. C. Bramwell. 149 6x9-inch pages, with 86 illustrations. Emil Grossman & Bro., New York. Price $2.

This book is a reprint of some articles from the "Motor Vehicle Review," and is based on the assumption that people wish to make their own motor carriages. To that end it gives complete working drawings of most of the parts, with descriptions of the drawings and methods of doing the work. There is also considerable discussion of various arrangements and plans, with comparisons of their advantages and disadvantages which are instructive to those desiring general information only.

"A Hand Book for Apprenticed Machinists." Edited by O. J. Beale. 141 4¼x6¼-inch pages with 87 illustrations. The Brown & Sharpe Manufacturing Company. Price, 50 cents.

This little book was originally published as an aid in the instruction of apprentices in the Brown & Sharpe works, but has now been placed on the general market. As is pointed out in the preface, skill in mechanical pursuits cannot be acquired from books, but, on the other hand, many important points in the use of machine tools are more matters of knowledge than of skill, and such knowledge may be acquired from books. From the chapter titles we select the following as indicative of the character of the book: Centering and the Care of Centers; Turning, Reading Drawings; Measuring, Lacing Belts; Drilling, Counterboring, Tapping; Cutting Speed; Figuring Gear Speeds; Figuring Pulley Speeds; Change Gears for Screw Cutting; Circular Indexing; Straight Line Indexing; Subdividing a Thread. Every apprentice desires to understand these things, and every machinist must understand them. In the usual course they are laboriously—and often imperfectly—acquired from foremen and fellow workmen who, however clear their understanding, are often poor at explanations. They are here explained by one who is recognized as one of the leading mechanics of the country and of whose facility in the use of the pen our readers do not need to be told. The chief criticism that we have to make of the book is that there is not enough of it. It contains as much, perhaps, as is desirable to place before an apprentice, but the ground which might be profitably covered in a book of this class is very large.

Personal.

George W. Scott, for the past five years mechanical engineer for the Pullman Company, has engaged in business as consulting engineer at 616 Rookery, Chicago.

Wm. V. Lowe, for the past three years assistant chief draftsman with United Shoe Machinery Company, at Winchester, Mass., has taken a position as mechanical engineer in the automobile department of the American Bicycle Company at Toledo, Ohio.

Inquiry for Machinery.

(159) Wanted, name and address of a manufacturer of a burnisher made of small steel rings fastened together on leather.

President Schwab of the United States Steel Corporation is, it seems likely, to become a resident of New York city. He has purchased a lot on which to build a house and has paid $865,000 for it. It is reported that the house he will build upon this lot will cost $2,000,000.

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant; see p. 20.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Punches & dies. Wal.M.Wks., Waltham, Mass.

W. Y. Schmucker, mfrs.' agent, Reading, Pa.

Wanted—Improvements in grinding machinery. Address Box 1435, Providence, R. I.

Experimental work, light machinery made. S. Messerer, 24 Boudinot st., Newark, N. J.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," $1, post paid. J.L.Lucas, Bridgeport, Ct. Send for index sheet.

"Brandt's Triple Expansion Gaskets" are the best for boilers. Randolph Brandt, 38 Cortlandt st., New York.

See 12 presses & dies for sheet-metals, S. E. cor. Machinery Hall, Buffalo Exposition. Ferracute Mch. Co., Bridgeton, N. J.

Wanted—A 100-pound power spring hammer of any good make. Send description and price to Thomas B. Jeffery & Co., Kenosha, Wis.

Wanted—Second-hand gas engine, about 60 horse-power; state name of maker, time used and full particulars. The Enterprise Mfg. Co., Akron, Ohio.

Machinery built by contract; modern equipment and organization; accurate work; prompt delivery; low prices; weights up to 5 tons. The Blanchard Machine Co., Boston.

Gear and Milling cutters, adjustable reamers and special tools; vertical millers, cutter and surface grinder and shears. Catalog of small tools free. R. M. Clough, Tolland, Conn.

Party with about $2,000 wanted to invest in a new polishing wheel; it has had a practical test and can be made cheaper than any on the market; it will stand strict investigation. Address Box 19, AMERICAN MACHINIST.

Wanted—Man conversant with general machinery, to invest some money; established business; mechanic or office man preferred; state amount you have to invest and references. C. T. Cummins, 218 E. Division st., Chicago.

Purchaser for small manufacturing plant; lot, 100x180 feet; machine shop, 32x68, two story, with line shaft and gasoline power; foundry, 40x54, new modern equipment; good location; for sale cheap. Hart-Parr Co., Madison, Wis.

A prominent typewriter manufacturing company have just opened a department for the manufacture and sale of novelties. Responsible parties having something of this class to turn out will oblige by addressing "Work," care AMERICAN MACHINIST.

Institutions retiring from business having machine tools, brass and wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

Wanted—Partner with capital: an ambitious man with mental comprehension and capital can learn of rare opportunity to establish lucrative business of magnitude, from moderate start; foundry and machine shop; opportunity for good machinery molder with $5,000. Address "Experienced Mechanic," Box 2, AMERICAN MACHINIST.

Wants.

Situation and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisement under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents.

Situations Wanted.

Draftsman with several years' experience, wants position. Box 15, AMER. MACHINIST.

Experienced draftsman wishes to change; Greater New York preferred. G. B., care A. M.

Position as foreman patternmaker; 15 years' experience; best of reference furnished. Box 13, AMERICAN MACHINIST.

Two experienced draftsmen want drafting, tracing, etc., to do home; reasonable rates. Haace Logan, Conshohocken, Pa.

Mechanical draftsman and designer, 8 years' shop experience, would like to make change. Box 18, AMERICAN MACHINIST.

Position wanted by technical graduate, as

draftsman; 3 years' experience; telephonic and electric work preferred. Box 14, AM. M.

Technical graduate, first-class draftsman, with complete shop experience, wants electrical position. J. A. P., care AMER. MACH.

Mechanical draftsman, 7 years' practical experience, desires position; first-class references. A. R., care AMERICAN MACHINIST.

Position as manager or superintendent of gas or steam engine shop; now holds first-class position; age 35. Box 5, AMER. MACH.

Mechanical draftsman, graduate and shopman, experienced designer of complicated machinery, wants position near city. Box 4, AMERICAN MACHINIST.

Mechanical draftsman, of technical education, with experience on marine and automobile gasoline engines, desires situation. Box 12, AMERICAN MACHINIST.

First-class toolmaker, with specialty in gages, wants good position; is capable of taking charge of small tool or gage department. Box 17, AMERICAN MACHINIST.

Turret lathe specialist, up to date in modern methods; capable of taking charge; 5 years' experience; Middle West preferred. "Chicago," care AMERICAN MACHINIST.

Technical graduate, age 27, 3 years' experience as draftsman, now employed on rolling mill machinery, wishes position with opportunities about November 1; part or no drawing. Box 9, AMERICAN MACHINIST.

Draftsman, 14 years' shop and drawing-room experience on air compressor, mining machinery and hydraulic tools, desires to make a change, either as foreman or draftsman; A1 references. Address Box 10, AM. M.

Superintendent wishes to correspond with parties desiring services of a practical, up-to-date man, familiar with the machine business in all branches, cost-keeping systems, shop management, duplication of work; references furnished. Box 16, AMERICAN MACHINIST.

Wanted—Position as foreman or assistant superintendent by screw machine expert; 15 years' experience as toolmaker and foreman; at present employed as foreman; best reference and reason for wishing to change; steady, sober and thorough mechanic. Box 21, AMERICAN MACHINIST.

Superintendent—A first-class, thorough, practical mechanic of exceptional ability desires to change; capable of taking full charge on modern lines any works; thoroughly posted on steam engineering, hydraulics, gas and oil engines and all the systems of making ice; a capable designer of executive ability. Box 3, AMERICAN MACHINIST.

General superintendent, energetic American, who understands his business from A to Z, would appreciate a position where there is something to do; prefers work to snaps; can organize a machine plant so as to minimize cost and give a reason why. Parties requiring an up-to-date man with plenty of push, practical experience and technical education, will find him at Box 440, AMER. MACHINIST.

Help Wanted.

Wanted—One good, first-class machinist. Jenkins & Lingle, Bellefonte, Pa.

Wanted—An experienced diemaker for sheet-metal work. Oneida Community Ltd., Sherrill, N. Y.

Wanted—Experienced men for responsible positions. Address James Brady, 220 Broadway, New York.

Wanted—Draftsmen experienced in machine tool work. Apply The Am. Tool Works Co., Cincinnati, O.

Wanted—First-class machinists. U. S. Long Distance Automobile Co., 307 Whiton st., Jersey City, N. J.

Wanted—Competent draftsman, familiar with steam engine and pump work. Box 6, AMERICAN MACHINIST.

Molders; 35c. per hour; engine and general job work; no bench men. Denver Engineering Works., Denver, Colo.

Wanted—Patternmaker (in St. Louis) on small, accurate wooden patterns; steady job. Box 425, AMERICAN MACHINIST.

Wanted—Six first-class, all-around machinists or toolmakers. Address, with references, Neumacher & Boye, Cincinnati, O.

Wanted—Machinist or man experienced in setting up and starting gas engines. Address Northern Engineering Works, Detroit, Mich.

Machinists wanted at San Francisco; wages $3.50 per day; bonus of 50c. additional per day for one year of satisfactory service. Box 370, AMERICAN MACHINIST.

Good patternmakers, both wood and metal, desiring steady employment, will find it to their advantage to apply to the General Electric Co., Schenectady, N. Y.

Wanted—First-class mechanical draftsmen familiar with railway shop work. Address, giving references and experience, "Manufacturer," Box 20, AMERIAN MACHINIST.

We invite applications from machinists and molders; give references, experience and wages expected; work on air compressors. Franklin Air Compressor Co., Franklin, Pa.

Wanted—First-class bench, lathe and grinding machine (Landis) hands for toolroom, also diesinkers experienced in small drop forging work. De Laval Steam Turbine Co., Trenton, N. J.

Wanted—Soon in New England, first-class draftsman with experience on machine tools; state reference, experience, salary expected, present position and how soon could accept. Box 424, AMERICAN MACHINIST.

Wanted—Four drill makers on small, accurate work; men familiar with small die work preferred; state age, experience and wages expected; works near Worcester. Address Box 422, AMERICAN MACHINIST.

We are enlarging our works, and will shortly require an increased number of skilled mechanics; we invite application from pattern makers, molders and machinists. Address the Westinghouse Machine Company, East Pittsburgh, Pa.

Wanted—A mechanical draftsman with experience on machine tool work or special heavy machinery; position permanent; must come well recommended; a young man preferred; state age, salary expected and references. Box 409, AMERICAN MACHINIST.

Wanted—Machinists; married men preferred; a few good vise men in a small town in Ohio to work on small, close work; good wages and steady work to competent and reliable men; in answering, state whether union or non-union. Address Box 423, A. M.

Wanted—Foreman for press room and machine shop of gasoline and oil stove factory; must be expert in planning and making dies and tools, capable in the handling of men and pushing out work; give reference and experience. The Monarch Stove & Mfg. Co., Mansfield, O.

Salesman wanted, who can demonstrate his ability to represent a prominent manufacturer of traveling cranes and to act as manager of his Philadelphia office; a splendid opportunity for the right party. Address, with full particulars of qualifications, etc., M. J. C., care AMERICAN MACHINIST.

Wanted—Hands for milling machine, vise, lathe, general, 2x24 screw machine and man to set up and take care of several hand screw machines; good wages to competent men; 9 hours; small and medium work; no strike. Address Ott. Mergenthaler Company, Baltimore, Md., stating where last employed and wages expected.

Wanted—A foreman for our machine shop, to take charge immediately; must be a thorough and up-to-date mechanic; we build nothing but marine work; none but sober men need apply; present foreman must go to higher altitude for his health; state age, experience and salary expected. Address The Jenks Ship Building Co., Port Huron, Mich.

Wanted—Instructor in machine shop practice, instructor in wood-working and pattern-making and instructor in forging and foundry work; state age, practical and teaching experience, references and salary; excellent equipment and opportunities for right man to develop work in each department, in the same institution. Address Box 433, AM. M.

Wanted—A competent machine shop foreman for shop located in Ohio, employing from 20 to 30 machinists; jobbing work and heavy machinery; must be capable of estimating machine time and working to drawings, and of hiring and handling men and get work out to advantage; state age, experience, salary and give references. Address Box 11, AM. M.

Wanted—Several competent mechanical draftsmen, with experience, to work on special machines; for the right men at least one year of work in view. Please address, stating age, past experience, salary expected, where previously employed and how soon available, L. F. Dieter, Engineer, Engine Division, The Lackawanna Iron & Steel Co., Scranton, Pa.

Wanted—Agents in every machine shop, to sell Saunders' greatly enlarged edition "Hand Book Practical Mechanics"; thousands sold, because it is the only common sense practical reference for machinists, toolmakers, draftsmen; price, post paid, only $1 in cloth, $1.25 in leather; it sells itself; big money in it; liberal terms. C. H. Saunders, 216 Purchase st., Boston, Mass.

Wanted—A young man as working shop manager, by automatic high-speed engine and machine manufacturers in Western New York, employing 400 hands; plenty of detail requiring constant attention and more than ordinary executive ability; permanent position and will pay well to one who can fill requirements; state age, experience and references in full. Box 436, AMER. MACHINIST.

(*Continued on next page.*)

Gould & Eberhardt, of Newark, N. J., call attention to an error in the description of their large drilling and tapping machine published at page 946. We state that the machine will tap up to 1½ inches, but this they say is the capacity of the tapping attachment only, the machine itself with the friction clutches being used for tapping larger than 1½ inches, the size of the hole that can be tapped in this way being, they say, "practically unlimited."

The use of the model tank at the Washington Navy Yard enables Naval Constructor Taylor to report the power requirements of ships ordered. The battleships, to attain 19 knots, must be driven by engines of 20,000 horse-power, and the armored cruisers, for 20 knots, will require 25,000 horse-power.

Rear Admiral Bowles, chief constructor of the navy, has asked the Navy Department to submit to Congress an estimate of $9,000,000 for repairs of men-of-war during the next fiscal year. This is the largest amount ever called for.

It is proposed now to give up the nautical terms starboard and port, and to use instead right and left. Why not?

Manufacturers.

Rumpf Bros.' textile plant, at Attleboro, Pa., has been burned.

The Lehigh Foundry, at Fullerton, Pa., has been destroyed by fire.

A new factory will be built for the Hart Weigher Company, Peoria, Ill.

The Findlay (O.) Sucker Rod Company is building an addition to its plant.

Fire has destroyed the carpet mills of James Hall, at Conshohocken, Pa.

The engine of the grist mill of J. H. Gibbs & Son, Edmore, Mich., has exploded.

An addition is being made to the plant of the Diamond State Fibre Company, at Elsmere, Del.

The Milwaukee Malleable & Gray Iron Works, Milwaukee, Wis., propose to enlarge their plant.

Contracts have been let for the erection of a factory building for the Detroit (Mich.) Forge Company.

A permit has been taken out for an 82x60-foot addition to the works of the Reading (Pa.) Iron Company.

Heyl & Patterson, Pittsburgh, Pa., will build a 90x200-foot plant in Allegheny for structural iron purposes.

The Getchell & Martin Lumber & Manufacturing Company, Des Moines, Ia., will build a new factory for its work.

The Reed & Barton Corporation, manufacturer of silverware, Taunton, Mass., is about to build a factory addition.

An electric light plant is to be installed by the Consumers' Electric Light, Power & Heating Company, Johnstown, Pa.

An addition is to be built to the plant of the American Radiator Company, Springfield, O., which will double the output.

The Harper Buggy Company, of Columbia City, Ind., is contemplating the establishment of a large branch plant in Niles, Mich.

A disastrous fire has occurred at the Rockeby paper mills, some four miles from Coatesville, Pa., owned by Shryock Bros.

The Granger-Hayden Carriage Company, Jackson, Mich., has the foundation for an addition to its factory about completed.

The Lebanon Foundry Company, Lebanon, Pa., has secured the old Mish foundry at that place and will increase the capacity.

The Maryland Metallic Bedstead Company, recently organized under the laws of New Jersey, will locate its plant in Hagerstown, Md.

The roller mill store-house and elevator of the Russell-Miller Milling Company, Jamestown, N. D., have been burned, but will be rebuilt.

The American Hoist & Derrick Company, St. Paul, Minn., has commenced an extension of its foundry, and new machinery will be installed.

The Moore & Butz foundry plant at West Newton, Pa., was destroyed by fire a few days ago, entailing a loss of several thousand dollars.

A two-story brick factory addition is to be built to the plant of John Blood & Co., hosiery manufacturers, Franklin and Somerset streets, Philadelphia, Pa.

A test is being made at the Du Bois Iron Works, Du Bois, Pa., of a new process of making tool steel. So far no results have been made known.

William Steele & Sons, Philadelphia, Pa., have filed plans for the erection of a new plant for the E. A. Gillander Glass Company, at Holmesburg, Pa.

It is rumored that Wickwire Bros., manufacturers of wire goods, Cortland, N. Y., are contemplating the erection of a new building, 90x300 feet.

Weyer & Co., of Cleveland, O., have bought land near Hamburg, N. Y., and are converting it into a brickyard to manufacture 500,000 bricks at one heat.

The plant of the Lewis Roofing Company, Moline, Ill., has been damaged by fire in the boiler-room and saturating department, which ruined some machinery.

The Jackson Iron & Tin Plate Company, Clarksburg, W. Va., will erect a plant at that place. The company has located its offices in the Leggett Building.

The Racine Knitting Company, which now has a plant at Racine, Wis., and one at Stevens' Point, Wis., has broken ground for a factory in South Beloit.

The manufacturing plant of the F. H. Lawson Company, metals and plate, Cincinnati, O., has been somewhat damaged by fire, though saved in the main.

Messrs. Steel & Wike, Philadelphia, Pa., contemplate the erection of a new boiler and engine-house. Kendrick & Co., Philadelphia, are taking the estimates.

The Canada Brass & Electrical Company, manufacturer of motors, etc., Toronto, proposes to remove its business, and is negotiating to locate in Guelph, Ont.

A permit has been issued for a two-story brick and steel car shop at St. Paul, Minn., for the Chicago, St. Paul, Minneapolis & Omaha Railway, to cost $50,000.

The New Castle Stamping Company, New Castle, Pa., has broken ground for its new plant, and expects to have everything completed about the end of the year.

W. J. Smith & Sons, Kansas City, will build additions, including a foundry. The plant will be used in the manufacture of wheel and drag scrapers, railroad plows, etc.

The Lockwood Manufacturing Company, Birmingham, Ala., has taken out a permit

(*Continued on next page.*)

Help Wanted—Continued.

Editor wanted for an engineering paper; must be thoroughly conversant with steam and electrical power plant machinery and its operation; must also be able to write fluently and correctly both from the standpoint of good English and from an engineering standpoint; must have good health; a good and permanent position; give full details as to age, experience, salary expected and all information that will help to form a correct estimate of your ability and qualifications for the position. Box 8, AMER. MACHINIST.

We are engaged in the manufacture of machinery and make a good many sheet-metal specialties, such as tanks, steel buckets and like articles; it is our intention within the next few months to provide a separate shop for this work and run the sheet-metal work as a separate department; we will need a competent foreman or superintendent to organize and manage this department; one accustomed to handling men and laying out work, and who is familiar with special tools, dies, etc., will be preferred. Address, with full particulars, Box 7, AMERICAN MACHINIST.

Draftsmen Wanted.

We have positions open for capable, experienced Mechanical Draftsmen. Our business is to assist Draftsmen and Engineers (technical men only) to secure positions when unemployed, and to better their positions when employed. Our business was established in 1893.

No registration fee. THE ENGINEERING AGENCY, 1605 Monadnock Block, CHICAGO

Patented.

Chips Never Choke

this new Tool Holder. It's never necessary to drive the tool out with a hammer and a nail. The tool is released by a single turn of the locking nut on the clamping bolt and will drop out of its own accord if the holder is tilted a bit. ∴ Book free.

Jeanesville Iron Works Co.,
Tool Dept., Jeanesville, Pa., U.S.A.
Denver Office, 1328 17th St.
Cable Address, "Jeanworks." A-1 and Lieber's Codes.

CLEVELAND GEAR WORKS

W. R. SAWYER, Lessee.
86 Seneca Street,
CLEVELAND, OHIO.
Gear Wheels and Gear Cutting of all descriptions.
Get Our Prices.

VALUABLE BOOKS.

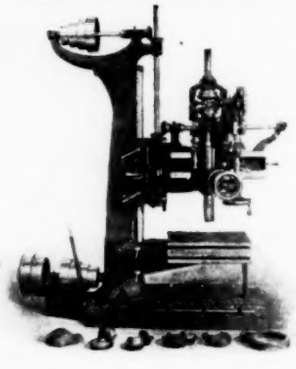
Mechanical Movements, Powers, Devices and Appliances, By Gardner D. Hiscox. **Price, $3.00**
Horseless Vehicles, Automobiles and Motor Cycles, By Gardner D. Hiscox. **Price, $3.00**
Gas Engine Construction, By Parsell & Weed. **Price, $2.50**
Liquid Air and the Liquefaction of Gases, By Prof. T. O'Conor Sloane. **Price, $2.50**
Gas, Gasoline and Oil Engines, By Gardner D. Hiscox. **Price, $2.50**
Complete Electrical Library (5 volumes), By Prof. T. O'Conor Sloane. **Price, $5.00**
Linear Perspective Self-Taught, By H. T. C. Kraus, C. E. **Price, $2.50**
Inventor's Manual, How to Make a Patent Pay, New, revised and enlarged edition. **Price, $1.00**
Saw Filing and Management of Saws, By Robt. Grimshaw. **Price, $1.00**
Compressed Air and its Applications, (shortly).

FREE A special descriptive circular of any of these books sent on request. Our 96 page catalog of scientific and practical books, sent free to any address in the world on request.

NORMAN W. HENLEY & CO.,
PUBLISHERS,
15 Beekman St., NEW YORK.

DIAMOND MACHINERY CHAINS

WE MAKE STEEL DRIVE CHAINS FOR THE TRANSMISSION OF POWER IN NUMEROUS PITCHES AND WIDTHS, INCLUDING BLOCK, ROLLER, CABLE OR BALANCING, AND TUBULAR RIVET CHAINS. SUITABLE FOR VARIOUS MACHINERY AND AUTOMOBILES. WRITE FOR CATALOG.
THE AUTOMOBILE & CYCLE PARTS CO.
DIAMOND CHAIN FACTORY. INDIANAPOLIS, IND.



Radial Drills,

2½–3½–5–6–7–8 Ft. Arms.
PLAIN AND UNIVERSAL.

Our tools have many patented features and all the latest improvements. Shall we send circulars?

THE FOSDICK & HOLLOWAY MACHINE TOOL CO.,
CINCINNATI, OHIO, U. S. A.